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THE GEOGRAPHICAL SIGNIFICANCE OF VITRUVIUS' *DE ARCHITECTURA*

By WILLIAM KIRK

Ut enim natus infans sine nutricis lacte non potest ali neque ad vitae
crescentis gradus perduci, sic civitas sine agris et eorum fructibus in
moenibus affluentibus non potest crescere nec sine abundantia cibi
frequentiam habere populumque sine copia tueri.

THE ten books on Architecture composed by Marcus Vitruvius Pollio and dedicated to the Roman Emperor Augustus, though well known to classical historians and archaeologists, are rarely mentioned in geographical literature and yet contain much of interest to our study. Nothing is known of Vitruvius himself apart from incidental autobiographical references within the text, and the precise date of publication of his work remains a problem, but it appears that he was of Italian origin,¹ had a liberal education, served as a military engineer in the Roman campaigns in North Africa of 46 B.C., and was recommended to Augustus by the emperor's sister. As his treatise always refers to the emperor as Octavian, this presumably dates it to the period prior to 27 B.C. when the official title of Augustus was conferred, and certainly at the time of writing Vitruvius held some supervising post in the works of reconstruction undertaken in Rome by that emperor. By the time of Pliny, *De Architectura* had become a standard work and elements from it are to be found in *Historia Naturalis* (XXXV and XXXVI); it is referred to by Frontinus in his detailed account of the aqueducts of Rome, and was still current in the Roman world as late as Sidonius Apollinaris (A.D. 432-487), but thereafter with the ascendancy of Byzantine influences it was lost to the lay medieval world. Manuscript copies, however, were preserved by the western church, including one² by Italian scribes taken to the scriptorium at monastic Jarrow, probably by Ceolfrid, and another at the monastery of St Gallen, and at the Renaissance of classical learning Vitruvius emerged as the outstanding authority on classical architecture. His teachings were carefully studied by Michelangelo, Bramante, Vignola,

and others, and played an important part in the development of what Lewis Mumford³ calls the 'proto-baroque' or 'neo-classical' form of city. They continued to influence town planners and architects until comparatively recent times (e.g. William Adam's "Vitruvius Scoticus," Edinburgh 1790). First printed in Rome in 1486, many editions of *De Architectura* have appeared, the most recent English translations being made by Morris Hicky Morgan⁴ and Frank Granger.⁵

For the geographer this comprehensive work which aimed primarily at the production of the 'complete architect' is of significance on four major counts. First, for the emphasis Vitruvius places on a thorough knowledge of environment and its influences on man the builder; secondly, for the unique details he provides on the techniques of port construction at the close of the pre-Christian era; thirdly, for his particular views on town planning in relation to climatic conditions; and fourthly, for the curious parallelism his ideas have with the principles of urban morphology enunciated by the early city builders in Southern Asia.

ENVIRONMENTAL CONTROLS

Vitruvius was a contemporary of Strabo, and while his contribution to geographical knowledge cannot rank equal to that of the latter, it is probably true to say that it reflects more faithfully the geographical ideas prevalent at this time at the heart of the Roman world. Strabo certainly wrote his geography for a wide public but was severely handicapped by the eccentric position of Pontus in the literary world, and although to the modern historian of geography he is the outstanding figure of the Augustan Age, in fact very few Augustans read his work. The encyclopaedic Pliny fifty years later had certainly never heard of it, and it was only with the rise of Byzantium and its influence on the European Renaissance that Strabo won the position of eminence he so richly deserved.

Of the dawning of 'possibilist' ideas evident in Strabo's interpretation of man's relation to environment there is none in Vitruvius, who thereby stands more squarely in the main stream of Graeco-Roman scientific thought, echoed later in Pliny and Tacitus. If Strabo finds Poseidonius, the Stoic philosopher of Rhodes and teacher of Geminus, "too interested in causes in the manner of Aristotle," Vitruvius on the contrary admires and supports the scientific determinism of Aristides and Timaeus (5th Cent. B.C.), Theophrastus (4th Cent. B.C.), Hegesias of Magnesia (3rd Cent. B.C.) and Posidonius (B.C. 130-50), and others "who showed by their writings that the peculiarities of sites, the properties of waters, and the characteristics of countries are conditioned by the inclination of the heavens." If to Strabo "the various arts, professions and institutions of mankind once they have been introduced, flourish in almost any latitude and even in spite of the latitude," to Vitruvius the empire of climate is the first of all empires. For to climate was due the variety of house types, ranging from Egypt to Gaul, and the manner in which they were sited. In climatic differences was to be found "the reason why the

races that are bred in the north are of vast height and have fair complexions, straight red hair, grey eyes and a great deal of blood," while "on the contrary, those that are nearest to the southern half of the axis and that lie directly under the sun's course are of lower stature with a swarthy complexion, hair curly, black eyes, strong legs and but little blood on account of the force of the sun." The pitch of voices likewise is due to the varying altitude of the heavens, for like the string nearest the angle of the musical Greek 'sambuke,' the shrill voices of the southern folk reflect the lower angle of elevation of the Pole Star. Southern nations, however, by reason of the greater heat are of greater intelligence and more "swift in the devising of schemes" than northern folk "enveloped in a dense atmosphere and chilled by moisture from the obstructing air," and "such being nature's arrangement of the universe and all these nations being allotted temperaments which are lacking in due moderation, the truly perfect territory situated under the middle of the heaven and having on each side the entire extent of the world and its countries is that which is occupied by the Roman people." Shades of Ellsworth Huntington and projections centred on London !

Associated with climatic controls of human activity are to be found details revealing the contemporary knowledge of the mechanics of climate itself. In these the influence of Titus Lucretius Carus, who a short while previously (55 B.C.) had interpreted Epicurean doctrine to the Roman world in his great poem "On the Nature of the Universe," is plainly seen. Vaporous mists exude from moist places under the action of the sun and stream skywards to coalesce into clouds composed of myriads of water atoms, and when these vast accumulations are crashed against mountain sides, assaulted by the wind or subjected to the pressure of their own weight, rain falls, in the same way as moisture runs down the walls of heated Roman baths. The movement of air is conceived as a phenomenon quite distinct from the formation of rain, and although materialistic interpretation of something which is not directly perceptible is difficult, nevertheless its effects are evident and can be explained as a stream of material particles bumping against objects that stand in its path. Vitruvius indeed 'demonstrates' by means of a hollow bronze ball or aeolipile that "when heat meets moisture the rush of heat generates a mighty current of air" in the same way as Lucretius in his Book VI, concerning meteorology and geology, pictures wind as something additional to existing air, hollowing out clouds, being heated by the contained fire and bursting forth in raging gales. This conception, of course, is by no means confined to the ancients. The eighteenth-century traveller, Ten Rhyne, quite a reputable scientist, believed that the mighty south-easter of the southern hemisphere "poured into" the air from the "table-cloth cloud" over Table Mountain at the Cape of Good Hope, while Bohun of Oxford in *A Discourse concerning the Origine and Properties of Wind* (1671) repeats the aeolipile experiment of Vitruvius to deduce similar conclusions.

The logical application of these theoretical considerations to the known world, however, led Vitruvius along strange paths. If solar

heat was the prime cause of rainfall, it followed that south winds would carry along more rain-producing clouds than north winds originating in cooler regions, and as mountains were the immediate cause of rainfall, it also followed that those mountains situated in the north athwart the path of the south wind would produce most water and hence be the zone of origin of the world's greatest rivers. Acquaintance with the extensive survey of the empire carried out by Marcus Vipsanius Agrippa, who at that time was nominally in charge of the water supply of Rome, and the commentaries, and map he had carved in the Porticus Vipsania confirmed these conclusions. For did not the great rivers of the world rise in the north and flow southward—the Ganges and Indus in India rose in the Caucasus, the Tigris and Euphrates in Syria, the Dnieper, Bug and Don from north of Pontus in Asia, the Po in Cisalpine Italy, the Rhône in Gaul, the Rhine in Celtica, and if the Nile at first sight seemed to run counter to this universal principle it was not so in fact, for “in Maurusia, which we call Mauretania, the Dyris, rising in the Atlas range runs westerly to Lake Heptabolus where it changes its name and is called Agger ; then from Lake Heptabolus it runs at the base of barren mountains flowing *southerly* and emptying into the marsh called . . . (missing) . . . It surrounds Meroë, which is a kingdom in southern Ethiopia, and from the marsh grounds there, winding round by the rivers Astansoba and Astoba and a great many others, it passes through the mountains to the Cataract, and from there it dashes down and passes to the north between Elephantis and Syene and the plain of Thebes into Egypt where it is called the Nile.”

BUILDING MATERIALS AND WATER SUPPLY

If Vitruvius merits attention for his diligence in recording the geographical ideas of early Greek and contemporary Roman authors, particularly as many of the works to which he refers perished in the confusion which followed the assassination of Alexander Severus in A.D. 235, he also commands respect for his consistent endeavour as a true Graeco-Roman to bridge the gap between theory and the practical problems of a Roman surveyor. Details are given of the sources of various raw materials, used in building construction : different grades of timber from the fast disappearing ‘high forest’ of the Mediterranean, clays for the making of bricks of various standard dimensions, quarry sand as opposed to sea sand for mixing with lime and water, building stones ranging from the igneous rocks of the Nile Valley to Greek marble, and natural colours derived from the green chalk of Smyrna, red earths of the Balearic Islands, and vegetable sources.

On questions of water supply he shows a considerable knowledge of the principles of hydrology and gives practical hints on the use of vegetal indications of water content of the soil, the relative water bearing capacity of various rocks and gravels, and the method of employing an oil lamp or inverted greased bowl in a pit to test ground moisture. Methods of conveying water, by lead or clay pipes and masonry conduits arched over as a protection against excessive evaporation, are described in detail with all necessary information on the

calculation of gradients and provision of city reservoirs. Of the various levelling instruments he prefers a chorobate (a straight-edge 20 ft. long set in the horizontal by means of plumb-lines coincident with graduated diagonal struts) to water levels, etc. He recognises the different properties of water in various localities and the influence it has on the health of local inhabitants, giving as one example, now well known to medical geographers as the goitre-iodine correlation: "The Aequians in Italy and the tribe of the Medulli in the Alps have a kind of water which causes swellings in the throats of those who drink it." Throughout, Vitruvius holds scientific experimentation in balance with sound field observation, and shows considerable knowledge of the natural resources of the Roman world.

PORT CONSTRUCTION

In studies on the historical geography of ports and port cities one major problem usually encountered is that of estimating to what extent current engineering techniques were capable of utilising and modifying the natural potentialities of port sites. Following the great engineering revival of the second half of the eighteenth century which found expression in ambitious port schemes of the nineteenth century, technical progress is generally well documented, but in the case of early ports little is known beyond that of which the works themselves bear testimony. Archaeological research on the Mediterranean seabord has provided a picture of the technical capabilities of Minoan, Phoenician, Hellenic, and Roman port engineers at some of the most ancient ports of the world, but it is exceedingly rare to find written evidence of the principles and methods which governed their work. Vitruvius (Book V, Ch. XII) provides such evidence in his discussion of harbours and shipyards, and with his normal historical inclinations holds in review the writings of Timoxenus, the work of Hippodamus of Miletus who planned the port city of Peiraieus at Athens for Pericles and later went with Greek colonists to Thurii in Italy, and the construction of Alexandria by Deinocrates.

Alexandria with its enormous time span of nearly 5000 years affords perhaps the finest gauge available of changing techniques of port construction. Its modern harbour dates from A.D. 1870, but earlier phases of harbour building can be identified in the submarine structures situated to the west of the ancient island of Pharos. An early phase about 3000 B.C. was followed by the construction of the great harbour of Pharos soon after 2000 B.C., which exhibits the massive structures typical of pre-Hellenic form, with breakwaters and quay walls devoid of mortar or cement built of rough-hewn blocks of limestone with rubble infilling, and utilising skilfully the irregularities of the sea bed. When Deinocrates built Alexander's port these earlier harbour works were below the level of the sea, and his plan included the construction of a great mole, 600 ft. wide and 1 mile long, from the mainland to Pharos through water 36 ft. deep, thus dividing the roadstead into two basins: the Great Harbour on the east and Harbour of Eunostos on the west, connected by openings through the

mole, thereby obeying the ancient rule that a port should have two entrances.

By this time concrete and iron dowels were used in the construction of sea walls, as is also evidenced by the earlier harbour of Hiram in southern Tyre and the mole Alexander built in his conquest of that 'island,' but the tideless nature of the sea must have imposed great difficulties on port engineers in sinking foundations of port works. In most of the Greek harbours little stonework was necessary as they usually consisted of small bays with their entrances protected by a short mole, but the problems faced by Roman engineers were more varied and led to many advances in technique, described by Vitruvius.

The soft alluvial silts found in many Italian estuaries and roadsteads were countered by methods of driving piles in deep water, and by varied foundation structures. For example, "if the bottom is soft the foundations are to be charred piles of alder and olive filled in with charcoal, as prescribed for the foundations of theatres and city walls. The wall is then raised of squared stone with joints as long as possible so that the middle stones may be well tied together by the jointing. The inside of the wall is then to be filled in with rubble or masonry." But of prime importance was the invention of the cofferdam, usually built of rush hampers or basketwork filled with clay, which could be sunk in coastal waters so as to enclose an area from which water could then be pumped by waterscrews or waterwheels, thus facilitating work on sections of the sea floor which would not otherwise be exposed in a comparatively tideless sea. When to this was added the discovery of 'pozzuolana,' a brown volcanic earth found near Rome and Naples which, when mixed with lime, formed a cement that would set under water, great progress in port construction became possible. The mole at Puteoli, western port terminus of the extensive sea trade via Alexandria to the Indian Ocean, carried on in Augustan times, was constructed in this way. "Earth is brought from the district which runs from Cumae to the promontory of Minerva (Sorrento) and mixed in the mortar two parts to one of lime. Then, in the place marked out cofferdams held by oak piles and tied together with chains are to be let down into the water and firmly fixed. Next, the lower part between them under the water is to be levelled and cleared with a platform of small beams laid across, and the work is carried up with stones and mortar as above described until the space for the structure between the dams is filled." In the case of exposed roadsteads, where heavy seas interfered with the cofferdam supports, a staging was built out from the shore to give added security and ease of transporting building materials. Subsequently, the port was to be provided with shipyards facing north as a rule, "for southern aspects because of their warmth generate dry rot, woodworms, and ships' worms with other noxious creatures," while for political security the port could be protected by drawing chains across its entrance in the manner of the Sidonian harbour of Tyre and many ports of the Indian Ocean during the early European period.

Notable by its absence, however, is any form of dredging. If such had existed it would most certainly have been mentioned by Vitruvius,

and we may conclude from this that, although there is reason to believe that dredging was practised by the ancients in maintaining irrigation canals, the technique never developed sufficiently to allow its application to river channels and harbours. It is this feature which led to trouble at the mouth of the Tiber, and which distinguishes port engineering as outlined by Vitruvius from that outlined by Vernon-Harcourt in the nineteenth century. Apart from the appearance of the mechanical dredger, which was to revolutionise harbour maintenance, and new sources of power for the carriage and placing of materials, Vitruvius is remarkably 'modern' in his discussion of the principles of port construction—an indication of the long period of still-stand or even retrogression in this field which followed the collapse of the Roman empire. A further indication of this period of quiescence in an associated subject is provided by Vitruvius' description in Book X, Ch. IX of a projected self-recording ship's log which he calls a 'hodometer,' an idea which does not find expression again till 1578 when William Bourne in his *Inventions and Devices* credits a Humfray Cole with the discovery, in about 1570.

URBAN MORPHOLOGY

During his discussion of ports and harbours one is left with the impression that to Vitruvius there was no strict dividing line between the concept of port and port city. As in many cases with which he was acquainted the port was actually included within the walls of its city, this is not surprising, while in addition the port architects Deinocrates and Hippodamus he so much admired were city as well as port planners. The fact that a city was also a port might mean the displacement of its forum from the centre of the town to a site near the harbour, but its function as a point of exchange and an environment of the higher life was unchanged, and it remained subject to the same laws of functional planning. For Vitruvius this meant an ordered siting of public places such as the forum, basilica, treasury, curia, theatre, baths, gymnasium and other agencies of the higher life, and a subdivision of the city into functional units according to some well-regulated pattern of roadways. Two such patterns he found acceptable. The first, strictly rectilineal as popularised by Hippodamus at Rhodes in 408 B.C. and Deinocrates at Alexandria in 330 B.C.; the second, radial as devised by himself in relation to his now famous circle of winds, which has been found engraved in many colonies of the empire, particularly in North Africa. This he derived from his studies of climate and consisted of establishing the points of origin of the eight winds of the heavens,—Septentrio (N), Aquilo (NE), Solanus (E), Eurus (SE), Auster (S), Africus (SW), Favonius (W), Carus (NW)—and then so orienting the streets of the city as to lie in the main transverse to these winds, with radial streets running out from the centre on bearings intermediate to their points of origin. This resulted in an octagonal city layout with outer wall pierced by gates at the cardinal points, an inner 'green belt,' followed by the eight major city blocks with internal straight streets joining the main radial roads at an angle, surrounding a central open space and forum. Each of the city blocks

was to possess its own community of interest and public buildings. By this orientation and arrangement of the city he ensured "that the noxious breath of the winds may be avoided."

Although Vitruvius' influence on the architecture of the colonies of the early Empire is noticeable, so much so that *De Architectura* has often been used as a guide in archaeological excavation, his concept of a radial city was not realised until after the Renaissance when the architectural despots of the 'baroque' school of planning forsook the ancient but living medieval accretions to provide their royal masters with new cities of geometrical form, e.g. Karlsruhe, Villa Nuova, Mannheim, etc. Most Roman colonial cities continued to be modelled on the foursquare, rectilineal layout of the Roman camp.

VITRUVIUS AND CITY PLANNING IN INDIA

A wholly unsuspected echo of Vitruvius' teachings, however, is found as far afield as India. Here the greatest source of information on town planning in early times is a collection of works on the science of measurement and architecture known collectively as the Silpa Sastras, of which the standard text is that of Manasara. Passed on by an amazing oral tradition, they record the principles of planning held by the caste or guild of master builders probably as early as the fifth century A.D., and are common to the traditions of both Gangetic and Peninsular India. Great adherence is shown to the idea of city orientation to the cardinal points of the heavens, as ascertained by gnomon and sun shadow, for in the northern quarter dwelt Brahma and the Devas, in the east Indra, in the south Yama, lord of Death, and in the west Senapati, commander-in-chief of the gods. In siting the city, due attention was to be paid to the water content of the soil which could be tested by digging pits or examining the ground vegetation, and propitious sites could be recognised by colour, smell, touch, and taste. Gates were to pierce the walls at the cardinal points and lead to a cross-roads at the centre of the city where the palace or temple should be located, and the remainder of the area within the walls was to be subdivided and allotted to various communities according to mystic geometrical diagrams such as the Paramasayika, Swastika, Dandaka, Nandyavarta, etc.

The two most common patterns were the rectilineal and the radial, both of which could be accommodated to the other principles of planning. Indeed, much of this teaching is so close to that of Vitruvius as to be hardly the result of coincidence; and this is further supported by the fact, first recognised by the Sanskrit student P. Kumar Acharya,⁶ that the treatise of Manasara is almost identical in form with that of Vitruvius, similar topics being discussed almost chapter by chapter. Explanation of this relationship, however, constitutes a most difficult problem. From internal evidence the Manasara can not be placed prior to the early Gupta period and Vitruvius not later than 27 B.C., which means a time interval between the two works of some 500 years. This may be bridged by Indian compositions which have now been lost or, as Acharya⁶ suggests, by postulating some other source from which Vitruvius and Manasara drew their inspiration. Certainly this

latter thesis is attractive, for the principles as enunciated by Manasara have many prototypes in earlier Indian tradition. The Indus Valley cities exhibit a marked rectilineal pattern, and the ideal Indo-Aryan village, as it evolved on the pioneer fringe of the Gangetic forests, expresses in miniature the forms which were later expressed in city construction. Furthermore, in the *Milindapanha* (questions of Milinda or Menander), which represents an imaginary dialogue between the Buddhist sage Nagasena and the Bactrian Greek King Menander of the second century B.C., the writer appears to be familiar with the four-square type of Hellenistic city which the Seleucids constructed in Asia, making Nagasena say: "It is like the case of the guardian of a city who when seated at the cross-roads in the middle of the city would see a man coming from the East or South, the West or the North," in the same manner in which Strabo (XII : 566) describes the cross-roads of Nicaea in Bithynia, "so that from one stone in the middle of the gymnasium a man could see the four gates."

That Greek influences were powerful in northern India at this period is unquestioned, and that they were absorbed into the Indian tradition would confirm a process which has been characteristic of Indian culture from times immemorial. Thus a common element drawn from Greek sources during that fertile Seleucid period when West met East may have entered the urban traditions to which both Vitruvius and Manasara gave expression. This, however, does not fully account for the remarkable similarity between the two texts, which in places would almost suggest that Manasara was translating into the Indian idiom ideas and techniques culled from *De Architectura*. Further research on early Indian literary compositions, indeed, may yet reveal an intermediate text, but at present it may at least be said that conditions at the beginning of the Christian era were favourable for the transmission of published works from the Roman to the Indian world. Almost from the very time at which Vitruvius was writing his *De Architectura* there occurred that immense break-through of Roman trade into the Indian Ocean which was to last for over three centuries: an episode referred to by many classical authors, but the full extent of which is only now being revealed by archaeological investigation. It is a very tempting picture to imagine that one of the Yavanas who formed bodyguards to the Tamil princes or who lived within the precincts of the Roman trading factory at Arikamedu had in his possession a copy of *De Architectura* which became popular with Indian civil engineers, who recognised in it much that was common to their own urban traditions.

In urban geography, in port studies, and in the history of geographical thought, Vitruvius thus holds a most significant position. In part this is due to the momentous times in which he lived, in part to his determination to preserve Greek scientific method and experimentation in a severely practical Roman world, but above all to the comprehensive and liberal nature of his genius. He may have intended to train architects, but has in fact provided a treatise in which most modern sciences and arts, including geography, can find records of beginnings.

¹ Verona and Formiae have been suggested as the most probable alternatives for the home town of Vitruvius.

² The Harleian MS—Brit. Mus. Harley 2767, known as MS 'H.'

³ MUMFORD, L. *Culture of Cities*. 1946. P. 77.

⁴ MORGAN, M. H. *Harvard University Press*, 1914.

⁵ GRANGER, F. London, 1931. 2 vols.

⁶ ACHARYA, P. KUMAR. Indian Architecture according to *Mānasāra-Silpasāstra*. Allahabad, 1927.

SOME EIGHTEENTH-CENTURY DEVELOPMENTS IN THE TEXTILE REGION OF EAST CENTRAL SCOTLAND

By W. H. K. TURNER

IT is commonly known that present aspects of the textile industry of east central Scotland, in the region of the Tay and Forth, stem from a wider background in which linen manufacture was the most distinctive element of economic life, and that they represent survivals from a more extensive regional development of the industry. This regional development took place within the area extending northwards from the Forth to Aberdeen and westwards to highland Perthshire, and within the period of the eighteenth century. In this paper the attempt is made to trace the main features in the early growth of the linen region, outlining the sequence of development as it appears from contemporary literature.

The two Acts of 1727 which resulted from the recommendations made by the Convention of Royal Burghs, one "An Act for better Regulation of the Linen and Hemp Manufactures in Scotland," the other "An Act for encouraging and promoting Fisheries and other Manufactures and Improvements in Scotland," initiated a policy of official encouragement of a traditional industry under the administration of a Board of Trustees for Manufactures.¹ It was the administrations of the Board, together with the provisions of the Bounty Act of 1742, which resulted in the great growth of the Scottish linen industry, particularly in the eastern counties between the Forth and the Highland edge.

GENERAL CHARACTER

"Linen cloth is our Staple commodity, and a manufacture we have been possesst of now Time out of Mind . . .", wrote Lindesay in 1733, by which time some definition of the eastern linen region already existed. In the south-west, in the neighbourhood of Stirling, serges and low-priced woollens were made, "all for Home-consumpt." In the north-east, in the Aberdeen area, coarse serges called fingrums were made from Scottish wool, together with knit stockings, the manufactures not needed for home use being sent to Holland and to London for re-export.² In addition to these economic limits set by the wool

manufactures of the south-west and north-east, the highland edge imposed physical limits in the north and west, pierced, however, by the settled valleyways. Only where Strath Allan leads to the Teith and Forth was there neither economic nor physical demarcation.

Within the region so defined there already existed notable differences so far as the quality of linen production was concerned. Regional unity by no means implied uniformity. In Angus there was a large production of cheap, coarse linen goods comparable in quality with the osnaburgs which then were being imported into England for re-export to the Plantations. Dunfermline, on the other hand, was already renowned for "their great Staple, Table-linen."³ These differences of character, formulated by the early eighteenth century and still features of the region, although no longer expressed in exactly similar form, were associated with the fact that the Forth and Tay have long provided elements of economic as well as physical distinctiveness, and have made for separation within the area.

Lindesay wrote at a time when the activities of the Board of Trustees were only beginning ; and although basic elements of character were already stamped on the region, its greatest growth was yet to come. "This manufacture," wrote Kames of the Scottish linen industry in 1766, "which, within the memory of man, scarce deserved the name, has of late years made a progress so rapid, as to become our chief manufacture." Angus, Fife, and Perth are referred to by him as the three great linen counties :⁴ their significance became more and more enlarged as the industry grew. The making of coarse linens, primarily osnaburgs, for export to the American Plantations became increasingly the concern of the expanding regional industry. In 1738 the Board of Trustees had distributed Continental samples of coarse linens for imitation and were encouraging osnaburg production.⁵ About this time, it is claimed, John Wallace, merchant and sometime Provost of Arbroath, became the first to manufacture osnaburgs in Scotland. Localised at first in Arbroath, a little later in Dundee, reaching Forfar about 1745, the manufacture quickly spread throughout most of the linen region.⁶

Angus became outstandingly the chief centre in a region which was to a considerable extent early defined by the coarseness and cheapness of its productions as compared with those of higher quality in the west of the Central Lowlands. In 1782 although 44 per cent of the cloth stamped for sale was made in Angus, its value was only 23 per cent of the total value of the cloth sold ; Lanark and Renfrew together produced about half this quantity at nearly twice the value.⁷

As for the direction of trade at this time, "London is our capital market" wrote Kames,⁸ served by the long-established links with the east coast ports, particularly those of the Forth and Tay estuaries, penetrating to the heart of the commercial lowlands and providing for the ships of the period adequacy of access to the regions of greatest economic wealth. Pennant was able to state, "The trade of Perth is considerable : it exports annually one hundred and fifty thousand pounds worth of linen . . . ships of 80 or 90 tuns come as far as the town."⁹

THE TEXTILE REGION ABOUT 1780

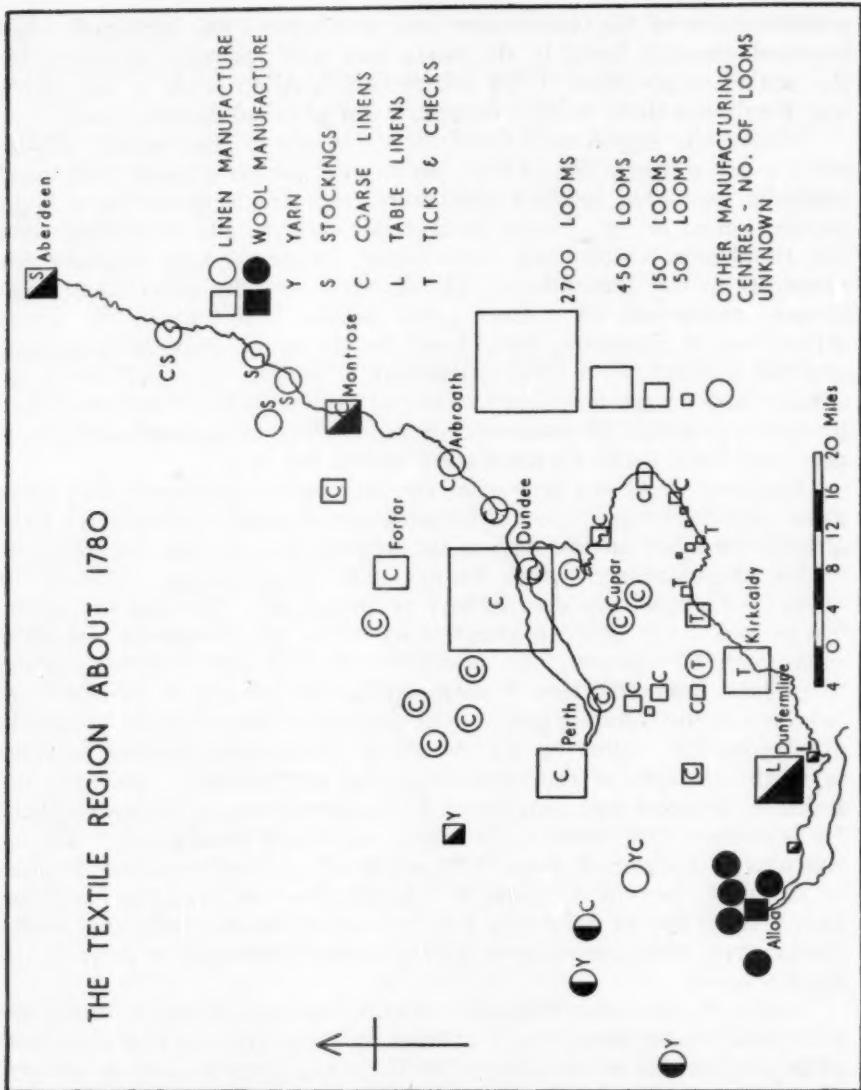


Fig. 1. The textile region about 1780. Manufacturing centres shown, ²part from those named, include: *Aber, Alyth, Austrail,* Auchterarder, *Auchtermuchty,* Blairgowrie, *Birch,* Blairgowrie, *Birch,* Blairgowrie, *Birch,* Callander, *Ceres, Clackmannan,* Connor, *Colinsburgh,* Coupar-Angus, *Crail, Crieff, Culross,* Dollar, *Dunkeld, Elie, Falkland,* Inverbervie, *Inverkeithing, Johnshaven,* Kilconquhar, *Kincross, Kirriemuir,* Largo, *Lawrencekirk, Leslie, Leuchars,* Leven, *Markinch, Menzie, Newburgh, Newry,* Pittenweem, *St Andrews, St Monance,* Stirling, *Stonehaven, Strathmiglo,* Tayport, Tilliscoultney. Those mentioned by Loch are given in *italics*.

In the latter part of the eighteenth century the linen industry had a widespread distribution throughout much of Scotland. So much is obvious from the comments made by Thomas Pennant and David Loch in the written accounts of their tours. There was no one particular area of localisation, but simply a diffuse distribution in which the eastern counties of mid-Scotland north of the Forth bulked largest in significance. Loch's account is valuable in that it provides the first comprehensive description of the types of linen goods made, permitting one to assess fully variations of character within the region at the time (1778).

The definition of the linen region by the established woollen interests of the south-west and north-east, noted as existing in the early part of the century, was as distinctive a feature when Loch toured the area. At Stirling and Bannockburn coarse carpets were made; at Alloa and Alva, camlets, plaidings, and other coarse woollens. Centering on Aberdeen, woollen interests were dominant, the manufacture of woollen stockings being of much more importance than the making of linen thread which was also represented in the town.¹⁰ Half a century had done little to obscure economic practices in those areas peripheral to the region selected, thereby serving to further establish the validity of the linen area itself. Within the region, too, there was a certain constancy of significance. The Fife towns along the Forth were as distinctive for their productions as they had been formerly and as they were to remain. Dunfermline, still noted for its manufacture of table linens, had extended its influence to other towns near by, to Inverkeithing, Pathhead, and Dysart, where similar fine fabrics were made. Pathhead and Dysart, however, virtually extensions of Kirkcaldy both in terms of settlement growth and economic interest, also shared Kirkcaldy's manufacture of checks and ticks.¹¹ Kirkcaldy and Dunfermline stood apart, their practices distinct from those common elsewhere within the textile area.

Most of the region was preoccupied with coarse cloth manufacture, mainly osnaburgs. Dundee, the great regional centre, possessed 2800 looms, as compared with the 600 in Dunfermline and 240 in Kirkcaldy, employed "mostly in low priced linens, Osnaburghs, and other branches,"¹² continuing the tradition of coarse manufacture established initially in the fifteenth century when the town had importance as a woollen centre and made plaiding for Continental troops. North of the Tay, the Angus textile towns of Forfar, Arbroath, Brechin, Kirriemuir, and Montrose shared with Dundee this emphasis on osnaburg production. Even Stonehaven, economically tributary to Aberdeen, witnessed for a time similar influences.¹³ Westwards however, Perth, the largest centre, possessed 600 looms "the half of which is at present employed in Silesias," which were finer quality linens, chiefly printed for handkerchiefs: this production co-existed with the making of coarse fabrics in town and district.¹⁴ Of the textile towns and villages south of the Tay, Cupar, St Andrews, Leuchars, Leslie, Falkland, Auchtermuchty, Kinross, and Leven, at least, were all engaged in making osnaburgs or coarse brown linens.¹⁵

With industrial growth trade itself expanded, for the most part along traditional lines. Kirkcaldy's textiles were sent mainly to English markets. From Dunkeld and Strathmiglo, minor centres both, flax yarn and linen threads, respectively, were sent to London. Dundee, however, so important itself and gathering to it the products of that area closely linked with it economically, had a considerable trade "to most parts of Europe and America."¹⁶

By the time that Loch conducted his tour, the regional linen industry in its growth had become increasingly dependent on imported flax, a fact which Loch—an antagonist of the industry—was doubtless pleased to point out as an indication of its vulnerability, having written in his *Essays*: "Flax, being an exotic, and the soil and climate unfavourable to its culture, can never be raised here to perfection; and . . . to attempt to establish the linen Manufacture as the staple of this country, is unnatural and absurd."¹⁷ The inclusion of flax-growing in agricultural practice had long been a traditional feature in many areas; but, despite the efforts made by the Board of Trustees to extend the flax acreage in the eighteenth century, in 1782 the amount of flax grown at home was only about one quarter of the country's requirements.¹⁸ In Kirkcaldy, Messrs John and George Fergus, owning forty looms and a large bleachfield, made their yarn from Riga and St Petersburg flax. At Colinsburgh, Riga flax was mostly used. So too, the osnaburg production of Brechin, Arbroath, and Forfar was based almost if not entirely on flax imported from the Baltic. At Aberdeen, the two big thread firms—the Gordon Mill Company and the Porthill Company—used Dutch flax.¹⁹ Clearly the widespread dependence on imported flax gave additional significance to the ports, and particularly to Dundee in relation to the region, for Dundee was the greatest flax-importing port in Scotland. The growth of the industry in the eighteenth century led to a reaffirmation of those North Sea trading patterns which, together with the coastal trade with England, had so long been a feature of Scottish commerce. It is in this that one can detect a potent reason for the fact that the greatest expansion of the industry took place in the effective economic hinterland of the supply ports of the east, particularly the coastal burghs of the Forth and Tay.

These were the basic characteristics of the linen region about 1780, after half a century of official encouragement, subsidy, and general economic nurture. Figure 1 presents a picture, incomplete in many respects but giving a summary view, based mainly on the written observations of David Loch, its most obvious feature being the correspondence of the textile industry in its distribution with the general settlement pattern. Loch gives the number of looms for only some of the centres, but the general adaptation of industry to settlement suggests that the relative importance of the other producers was in most cases a measure of their size as population centres. Although some of the characteristics displayed were doubtless inherited features, they had received further definition as the result of the economic policy of the period, and were sufficiently defined now to affect in an important manner the trends of future development.

ORGANISATION AND FUNCTION, ACCORDING TO THE
OLD STATISTICAL ACCOUNT, 1790-1798

At the end of the eighteenth century, contemporary literature permits one to make a comprehensive analysis of the main features of the region. Acceptance of the new methods of machine spinning of flax was only just beginning, and what Hamilton refers to as "the primitive partnership of farming and manufacturing industry" provides the key to the interpretation of industrial activity in most areas. Small-scale flax-growing in much of the country, for example, in upper Strath Allan and around Blairgowrie,²⁰ supported a domestic linen industry which achieved national significance only by virtue of the degree of commercial organisation imposed by the large urban centres. Industry in its initial distribution was simply an adaptation to the existing fabric of settlement, ranging from the farming households to the larger towns where the concentration of linen weaving was sometimes sufficiently distinctive to inspire suburban growth, as was the case in Lochee, which emerged in the mid-eighteenth century as a weaving suburb of Dundee.²¹

There was an intimacy of association between rural and urban areas. In the rural areas, of the two main aspects of the domestic linen industry, the satisfaction of home needs and the provision of a source of income, the latter had much significance in the broad economic contexts of the period, for the marketing arrangements bring out the varying degrees of the functional importance of settlement in town and country. The commercial organisation of such rural industry fitted in quite naturally to the existing hierarchy of settlement. Farm, market village, market town, large town, not necessarily in that order, each disposed of the yarn and cloth not actually needed for home consumption by way of hawkers or the agents of the master merchants of the commercial centres who also had importance as distributors of flax.²² The ports had particular significance in an area whose linen industry largely depended on imported flax and was largely devoted to export to London or direct to the Plantations. Thus, in the Angus parish of Tealing, where there were ninety weavers making coarse linens for the Dundee market, the flax used was mostly foreign and was brought from Dundee.²³ Other commercial centres, too, were of importance in integrating the dispersed activities of a region, notably the manufacturing market towns of Strathmore and that of Cupar, Fife.²⁴ In Cupar the town merchants brought cloth from St Andrews, Crail, Falkland, and elsewhere, and employed spinners in central Fife and in the coastal settlements of eastern Fife. Loch wrote of Cupar: ". . . the immense quantities of yarn bought and sold in the several markets almost exceeds the bounds of credibility."²⁵ Though the largest centres stood out most boldly and spread their influence wide, there was a considerable degree of local autonomy in economic practice and a greater flexibility than is the case now that modern communications exercise a certain rigidity of control and make for greater concentration at selected points.

Within this general framework of town and country there existed

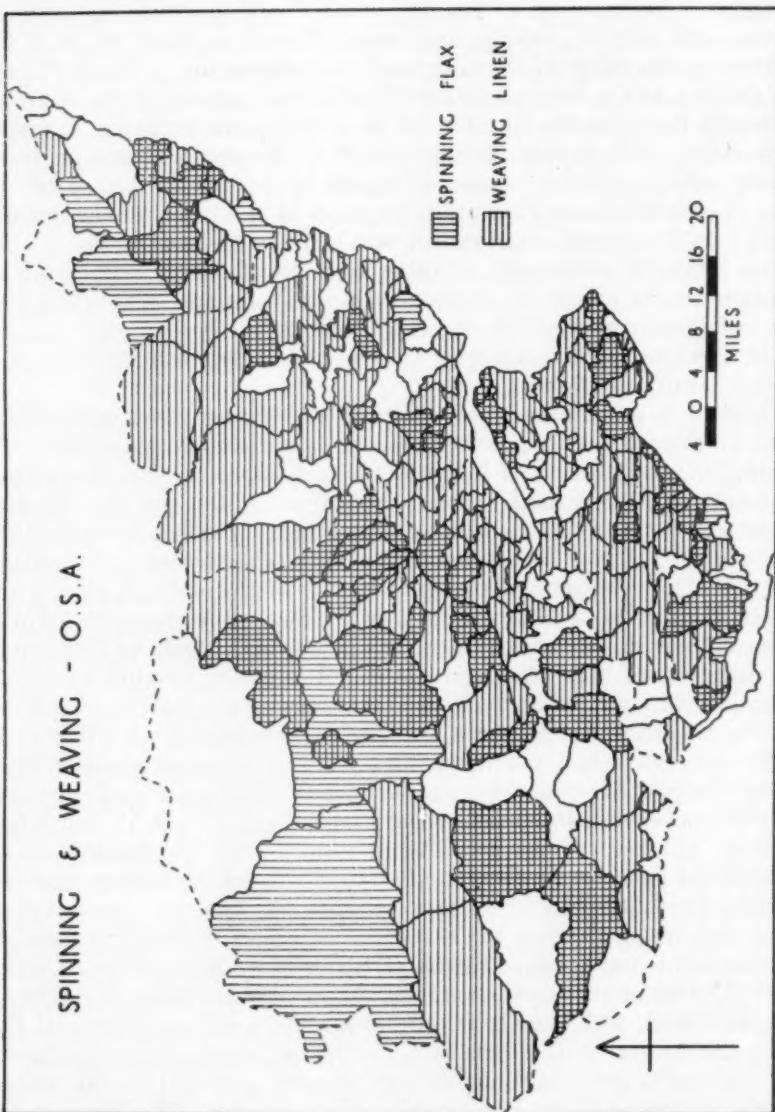


Fig. 2. Spinning and weaving of linen, according to the Old Statistical Account.

few elements of functional distinctiveness by the end of the century, in terms of the distribution of the primary industrial processes of spinning, weaving, and bleaching. Spinning and weaving, being typically domestic in method, were ubiquitous practices, and it is difficult to say if some areas had more significance than others. It is probable that the evidence provided in the parish reports of the Old Statistical Account is very incomplete. Figure 2 sums up the position, those parishes whose reports make specific mention of flax-spinning being marked on it. Spinning was largely the part-time occupation of women, often an intermittent activity, being dropped in the busy farming seasons when all the labour in the peasant household had to help on the land. It was among the most common and unremarkable of rural practices, and its distribution was simply co-extensive with that of all rural settlement. As James Donaldson observed in southern Perthshire, ". . . the women are very industrious, and spin a great quantity of woollen and linen yarn for the market, besides what serves their families ; but especially towards the Highlands."²⁶

Weaving, however, similarly domestic in method but often a full-time occupation, was far more commercial in its organisation than spinning ; and thus its distribution reflected its attraction to those settlement units which possessed commercial functions, particularly the larger towns, where weavers commonly worked in small hand-loom factories. In Newburgh, for instance, there were some workshops "with perhaps 12 looms employed by one manufacturer."²⁷ In Dundee as early as 1776 James Halliburton had an osnaburg factory at West Port.²⁸ Figure 1 shows the importance of many of the towns as weaving centres. Figure 2 shows the widespread distribution of linen weaving, it being a practice in nearly all the parishes within the area. It must be borne in mind that the distribution shown, as in the other aspects of economy selected for mapping, is a minimum one, due to the limitations associated with the parish reports of the Old Statistical Account.

Most forms of collective settlement attracted concentrations of weavers. Many villages were substantially weaving villages. In the account of Dunnichen parish, Drimmittormont is described as "a very old village, inhabited by weavers, each of whom occupy 6 or 8 acres of land."²⁹ The small holding, indicated here, was quite typical in the weaving settlements of the rural areas, as, for example, in Newtyle and in the Perthshire parish of Kinnaird.³⁰ Weaving in such areas was largely a commercial occupation in an economy which included elements of subsistence agriculture. In coastal areas, weavers were able to depend on fishing rather than agriculture as a supplementary economic practice. In Newburgh, for instance, the 270 weavers there were part-time fishers also, fishing becoming important when cloth "falls low on the market."³¹

So far as bleaching is concerned it probably had much the same ubiquity of distribution as that of spinning and weaving prior to the encouragement given by the Board of Trustees to the establishment of public bleachfields, for there is an abundance of surface drainage in the whole area. From the time that Lindesay made his plea for the

SOME FEATURES OF TEXTILE WORKING - O.S.A.

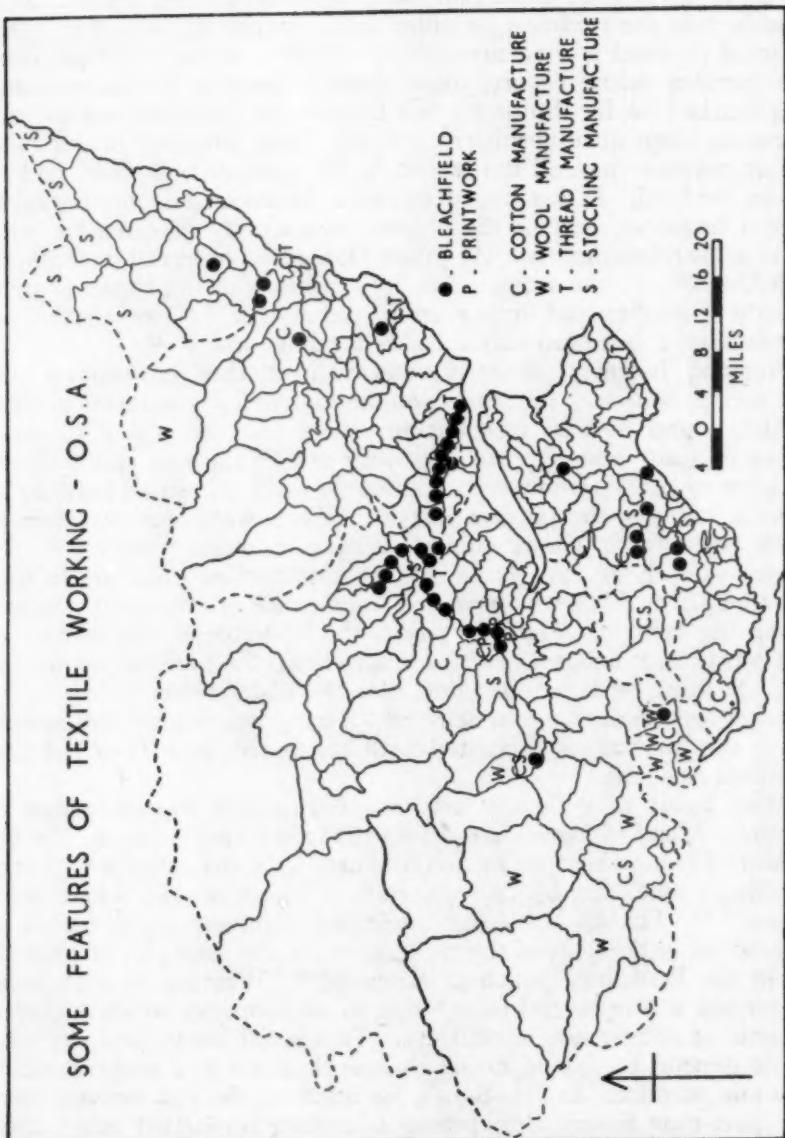


Fig. 3. Some features of textile working, according to the Old Statistical Account.

more general use of public bleachfields so that "all of the same staple would be also of the same colour," and so that "Many Hundreds of Women (would not) misemploy five Months of the Year, in . . . bleaching . . . a few pieces of ordinary Linen, on the banks of every running Brook, or near any large Spring,"³² public bleachfields were increasingly established as regional industry expanded, the Board of Trustees making grants of £50 per acre for this purpose. It is not surprising that initial developments took place near to the important textile towns, where the necessary capital and commercial organisation—so necessary for the conducting of a large bleachfield—existed, and where there was the greatest need for the concentration of the finishing processes. Considerable significance became attached to suitable sources of water supply near to the more important textile towns. The rivers Leven and Ore in south Fife and the Dighty in south Angus provide good examples of minor streams acquiring a local significance out of all proportion to that suggested by their size alone, in these cases reflecting the commercial importance of the Kirkcaldy-Leven group of textile centres and Dundee respectively. Other rivers and streams significant in these contexts included the Eden, Devon, North Esk, South Esk, Luther, Brothock, Isla, Ericht, and, outstandingly, the lower Tay (Fig. 3).

The bleachfields for the most part had only localised importance, primarily serving the larger textile towns and the areas proximate to them. Thus, Brechin had a bleachfield on the South Esk; near Coupar-Angus were bleachfields at Balgersho, Borland, Baldinnie, and Kirksteps; Arbroath had a field on the Brothock; along the North Esk, Logie and Craig fields were controlled by the commercial interests of Montrose; Laurencekirk had a field on the Luther Water.³³ In Fife there were bleachfields in the parishes of Abbotshall, Auchterderran, Cupar, Leslie, Markinch, and Scoonie, the most significant developments occurring along the Leven in relation to the textile centres along the coast.³⁴ Dunfermline, nearer the Devon than the Leven, sent its goods westwards to the field which had been established by William Haig in the parish of Dollar in 1787, in the woollen area of Clackmannan.³⁵ Among the most spectacular of these developments were those which occurred along the small stream of the Dighty in relation to the needs and interests of Dundee: in the parish of Mains of Fintry there were nine bleachfields at this time, "three of which are carried on upon a very large scale."³⁶

All these bleachfields had emerged in relation to the requirements of the textile manufacturing centres, and were mostly of local significance only. This was not always the case, however. For instance, Loch had noted that at Strathmiglo fabrics were bleached which came from Glasgow, Paisley, Perth, Stirling, and elsewhere.³⁷ It must be borne in mind that the bulk of the linens manufactured for export were of a coarse, unbleached variety; so that the bleachfields were of importance only to some of the branches of the textile industry, probably having a much greater relative importance with regard to the making of checks, ticks, and diapers in the south Fife towns than to the osnaburgs, harns, and the like of Angus and Perthshire.

There emerged one area, however, distinctive for bleaching and finishing generally, which had far more than local significance, and where tradition has preserved these long-established interests to the present day. This is the region of the lower Tay, in the hinterland of Perth, a node of routes where any commercial development dependent for its success on a multiplicity of contacts might well succeed. Here, about five miles up-river from Perth, William Sandeman established a bleachfield at Luncarty, on a site alongside the Tay which was in 1732, according to Pennant, "a meer bog," "but now," he adds, "converted into good meadows, and about 50 acres covered with linnen."³⁸ By the time Loch toured the district there were three bleachfields, Luncarty, Tulloch, and Huntingtower, in order of establishment, the two latter along the lower Almond and fed by a canal which had served the corn-mills of Perth from at least as early as the mid-thirteenth century.³⁹ At the end of the eighteenth century there were in addition three bleachfields in Cargill parish, and Stor-montfield bleachworks in the parish of Redgorton, all alongside the Tay. Linens of various types and cottons were bleached at these fields to an extent which, states one of the parish writers, "far exceeds the quantity that is woven or otherwise manufactured in the town and district around." Cloth was sent there from the principal textile towns in central Scotland and from even further afield.⁴⁰

This concentration of bleaching along the lower Tay and Almond was the main feature in a wider concentration of the finishing processes. Printing was another established specialty. At the end of the century there were three printing works in the neighbourhood of Perth, at Ruthven, Tulloch, and Cromwell Park, which were mainly engaged in printing the linen handkerchiefs made locally for eventual shipment at Perth on the salmon boats destined for the London market. The print-works at Ruthven was established in 1792, on a site formerly occupied by a small bleachfield. Indicating the importance of the multiple human contacts which create industrial origins and associated with the spread of cotton working from the west, the print-works at Cromwell Park had been established earlier, probably about 1780, by a William M'Alpine, "from the neighbourhood of Glasgow . . . who had been bred a calico printer."⁴¹ (Fig. 3.)

There is no evidence that the distinctiveness of the Perth district as a finishing area exercised any great influence on the movement of linen goods in the region as a whole. It was not, in the complete meaning of the phrase, the finishing centre of a region, but simply the most outstanding of a number of centres. The fact that much of the linen manufactured was bleached locally or exported unbleached was related to the coarse character of production in most of the region. The need for cheapness of manufacture meant that the industry could be most effective when it was developed to the greatest extent local resources would allow.

These were the main features of the linen region at the end of the century. By this time industrialisation had been initiated at a few places within the region where there was machine spinning of cotton or of linen yarn; and the spread of cotton manufacture from the west,

which the last part of the century witnessed, had given, for the first time, clear definition to the linen region itself. As the Glasgow cotton region extended its influence eastwards, cotton working was accepted in a number of places within the linen area (Fig. 3), but only on the margins did it take firm hold. These changes more properly provide an introduction to the transformation which nineteenth-century developments were to provoke. It is enough to note now that by the last decade of the eighteenth century the linen region of east central Scotland existed in its most complete form, and had developed sufficient potency to affect markedly the character of changes yet to come.

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- ³⁵ O.S.A. 15 (10) : 164-165. ³⁶ O.S.A. 5 (16) : 225.
- ³⁷ LOCH, D. Tour through Scotland. *Op. cit.*, pp. 55-56.
- ³⁸ PENNANT, T. *Op. cit.*, p. 74.
- ³⁹ LOCH, D. Tour through Scotland. *Op. cit.*, pp. 101-104 ; O.S.A. 17 (44) : 637-639.
- ⁴⁰ O.S.A. 13 (33) : 542 ; 15 (25) : 530-532 ; 18 (2) : 78-79 ; 17 (44) : 637-639.
- ⁴¹ O.S.A. 17 (44) : 638 ; 15 (25) : 530.

THE ABERDEEN UNIVERSITY EXPEDITION TO CYRENAICA, 1951. PART III.

By W. B. FISHER, I. R. FRASER, and D. W. ROSS

CYRENE

THE town of Cyrene, which gives its name to the province of Cyrenaica, lies at a height of nearly 2000 ft on the northern flank of the Jebel Akhdar, where a series of small fault-scarps drops steeply to the Mediterranean some six miles away. The modern settlement, named Shahat, is no more than a village that depends for a living upon a weekly market in grain and animal products, and upon a certain activity during summer as a hill station. One modern hotel is sufficient to cater for the small number of wealthier Libyans who are able to leave behind the sultry heat of Benghazi for the cooler, drier conditions of the Cyrenaican uplands.

Modern Cyrene was far outpassed in size by the ancient city, once named as among the largest in Africa.¹ According to Herodotus, Cyrene owed its origin to Greek colonists from the island of Thera, who, after several vicissitudes, finally established a settlement in the first part of the seventh century B.C. It is probable that the earliest site occupied was that a little to the south of the area now covered by the Sanctuary of Apollo. Here an abrupt scarp of Eocene limestone has been broken by a small northward-trending consequent valley ; and from the lower levels of the limestone exposure, which is banded by clay and intercalations of less permeable marl, emerge several moderately large-sized springs. These are certainly the highest in altitude in the whole country, but are probably exceeded in volume by those of the Wadi Derna south of Derna (see below).

As the town grew in importance, there arose a commercial quarter sited further to the south, on the higher ground above the limestone cliff, with an agora (market) as its focus. A second and larger cleft, the Wadi Bil Ghadir, strikes south and eastwards a little to the west of Cyrene, and breaks the northward-facing scarp into a partly de-

tached butte that falls steeply to the sea, and was therefore of significance as a defensive site (Fig. 2). Along the lower slopes of this wadi a second group of springs is located, though on a scale far smaller than those near the Sanctuary area. The surface of the first step-fault northwards below Cyrene would appear to have been highly cultivated—very much more intensively than at present—whilst from the archaeological remains it would also seem that cultivation spread irregularly over the rising ground to the south.

The Sanctuary area became the centre of a fertility cult associated with Apollo and a nymph Kurana—hence Cyrene; and water is

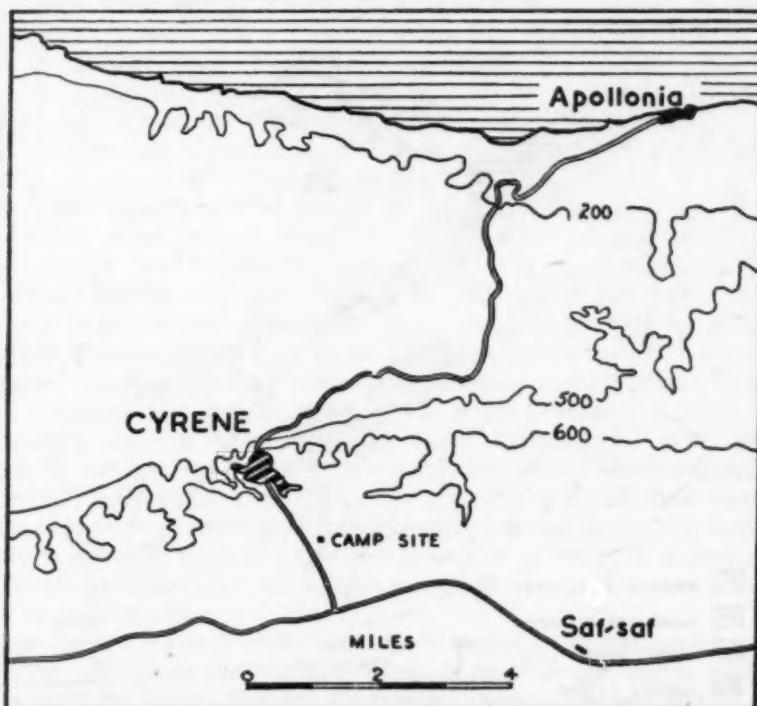


Fig. 1. Sketch of the Cyrene area. Contour heights in metres.

mentioned as playing a considerable part in ritual observance. At the present day, Cyrene is one of the very few parts of Libya where free-flowing surface water can be observed; and possibly this was also the case in Classical times. On this basis, one might argue that climatic conditions have not greatly altered since the Classical period. Cyrene seems to have enjoyed its greatest prosperity in the fifth-fourth century B.C., but its importance continued throughout Roman times, as shown by the construction of elaborate edifices such as the Forum and greater Baths, the latter dating from Trajan (A.D. 98-117). Some few centuries later there took place a series of disasters: major crop failures, invasions of locusts, protracted raids by Berber tribes, and finally, a severe

earthquake. The city was gradually abandoned, and since the eighth century A.D. its importance has been in eclipse.

At Cyrene there is an overwhelming *embarras de richesses* both for the archaeologist and the geographer; but it was decided to limit the Expedition's work to a survey of one part of the vast burial grounds which extend over many acres south of the city. Comparatively little has so far been worked out concerning specifically geographical aspects such as water-supply, land use, and communications. Accordingly, one small area lying well to the south near the modern main road from Cyrene to Derna was investigated in some detail. Lack of equipment

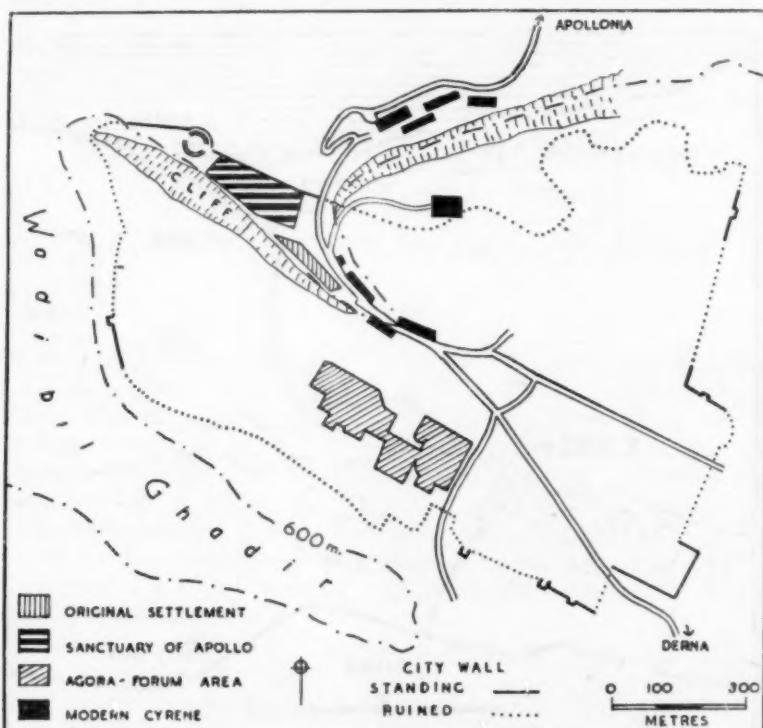


Fig. 2. Plan of Cyrene (in part after Hyslop and Applebaum). 600 metre contour shown.

for extensive excavation was, of course, a major handicap, and thus it must be emphasised that the results obtained must, in many cases, be regarded as provisional, since these are based mainly on surface observation.

Burial Grounds. It would seem that burial within the city itself was generally forbidden—one of the earliest rulers of Cyrene is mentioned as having been specially accorded this privilege after death. Hence interments took place away from the city, and often on family holdings of agricultural land, with frequent siting of mausolea and tombs close to boundary marks. This was apparently very much the case in the area surveyed—it was possible to observe one well-defined avenue

with branching lanes, marked out by standing stones that are still *in situ*. Intersections, and what would seem to have been property boundaries, were indicated by larger stones.

Interment took place in rock-cut tombs, in sarcophagi, and in various forms of built tomb : and all are represented on the area mapped (Fig. 3). A carefully aligned row of sarcophagi will be noticed, and a few others, scattered singly, were observed elsewhere. Rock-cut tombs are numerous all round Cyrene, especially in the cliff face on either side of the town, and several were to be seen in the vicinity of the Expedition's camp-site. Where surface outcrop allowed, the tomb-chambers were cut horizontally as an adit, and the entrance was closed either by means of a door turning on stone or bronze hinges, or by a large movable stone. One such tomb, about one-quarter of a mile from the area mapped, is now occupied by an Arab family. Elsewhere within the area surveyed there are a number of purely underground chambers, usually below a surface monument. The largest of these was surveyed by one of us (I. R. F.), and a summary plan is shown on p. 61 of Vol. 68 (Fig. 2 of Part I).

The built tombs offered much of interest, both in size—which ranged from small private sepulchres to extensive communal tombs with a temple and courtyard—and in style of construction. The earliest built tombs, as distinct from those hollowed in the rock, would appear to have been constructed in a roughly pyramidal shape, suggesting considerable affinities to Egyptian practice. A later development was the so-called 'step-tomb'; whilst a third phase, which can be dated to the period covering the second century B.C. to the first century A.D., is exemplified in the 'shrine-tomb,' with predominantly straight walls, and a restricted, formalised development of steps usually only at the base (Plate 2). Interment in all these tombs appears to have been most probably by wrapping and laying the bodies on shelves, since no signs of stone coffins can be traced. It is perhaps superfluous to state that all tombs examined had, of course, been broken open long ago.

Water Supply. The burial area was remarkable for the number of devices for catchment and storage of water, and for the way in which these latter were juxtaposed among tombs, monuments, and roads. A small aqueduct was traced for several hundred yards (Fig. 3). This, most skilfully engineered to take advantage of a very slight fall in ground level, consisted of an open stone channel about 9 in. by 6 in. in section, cut from single blocks of limestone laid end-to-end and caulked. In places, though by no means everywhere, the channel had a substantial base. The intake (in the south-east) would seem to have been either from a large *foggara* (described below) that ran south-eastwards from Cyrene, or else from local catchment in grounds lying about half a mile off. Where it crossed a shallow hollow, the aqueduct was raised on a larger structure, traces of which could still be seen.

On the western side of the site were several small water-tanks cut in the rock to a depth of several feet, and fed by surface intake collected in gullies hollowed out of the surface rock. The porous nature of the

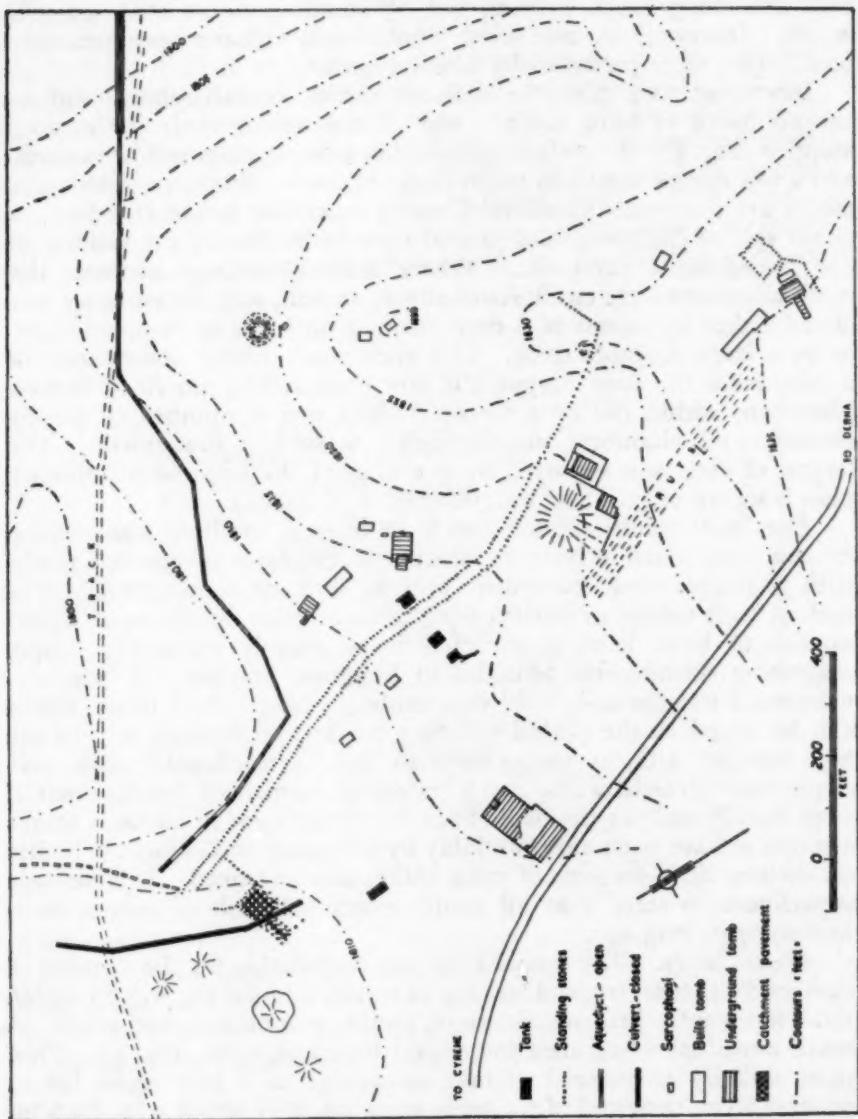


Fig. 3. Map of portion of the burial ground to south of Cyrene. All contours surveyed on the ground. Monuments, etc., to scale.

limestone had necessitated lining the tanks with a $1\frac{1}{2}$ in. layer of grey plaster compounded with ash (see Plate 4). Although intakes were visible, no outlets could be seen, and the presence of stone steps makes it clear that water was most probably carried from the tank in jars, exactly similar to present-day practice in India. Presumably the water collected in the tanks would be used for irrigation of the surrounding fields : it is difficult otherwise to account for their presence in a burial ground that was presumably uninhabited.

Other matters of interest were the existence of carefully prepared catchment pavements—cleared expanses of rock outcrop with a rough fall in level to one corner, whence a channel led off either to a tank or to a stone conduit. These pavements were quite small—no more than five or six square yards in total area.

Finally, in this area there occurred a number of well-made underground culverts or conduits. One of these could be traced for a short distance to the north-west from a near-by group of catchment pavements, and consisted of a channel 18×12 inches section, with closely fitting stone slabs completely covering the top. At some distance away (not shown on the diagram) lay the conduit or foggara already mentioned. This was a major construction designed most probably to bring water to Cyrene from the south-east, where local exposure of clays in the bed of a Wadi gives rise to a number of springs. This foggara was several miles in length, and consisted mainly of a narrow tunnel fairly deeply underground, marked by small vertical shafts at intervals. Each shaft had a stone coping, and, although construction was good, it would not seem that the system was ever airtight, thus ruling out the possibility of a siphon to raise the water over high ground. The foggara—tested by water-flow and survey—appeared to dip very slightly indeed towards Cyrene, and hence burrowed in places deeply below higher ground, with an aqueduct to cross lower levels. The fact that inclination was so small—a feature also of the smaller conduit mentioned above—implies a high level of engineering ability. Here was no hurried adaptation of the existing slope, but a most careful plan designed in relation to general surface topography. The Arabic term *foggara* has been applied, since it would appear to be exactly similar to structures of this name that are still in use on other parts of the Middle East.

SAF SAF

Some seven miles away from Cyrene, on the main road to Derna lies the well-known Roman reservoir or cistern of Saf Saf described by Professor J. W. Gregory.² As Fig. 4 shows, this structure is a long narrow trough, with stone retaining walls that support a heavy masonry arch. The arch is composed of stones each measuring approximately $12 \times 18 \times 52$ inches, set eleven per side with a central keystone. The stones carry numbers and marks, still perfectly legible, suggesting that they were quarried *en masse* to a given size and assembled on the spot. Water was collected in the reservoir by surface inflow through a number of entry-ports 10×12 inches in width, spaced at intervals of 11 to 13 feet. The extent of this inflow is indicated by deposits of

calcareous sinter (up to 6 in. thick) at the base of each entry-port. Surface inflow, undoubtedly the principal source of supply, may not however have been the sole means of water catchment, since a hole dug to a depth of three feet in the floor of the cistern yielded a tiny trickle of water—this at the driest time of the year. The presence of this, and possibly other small springs, would explain the general siting

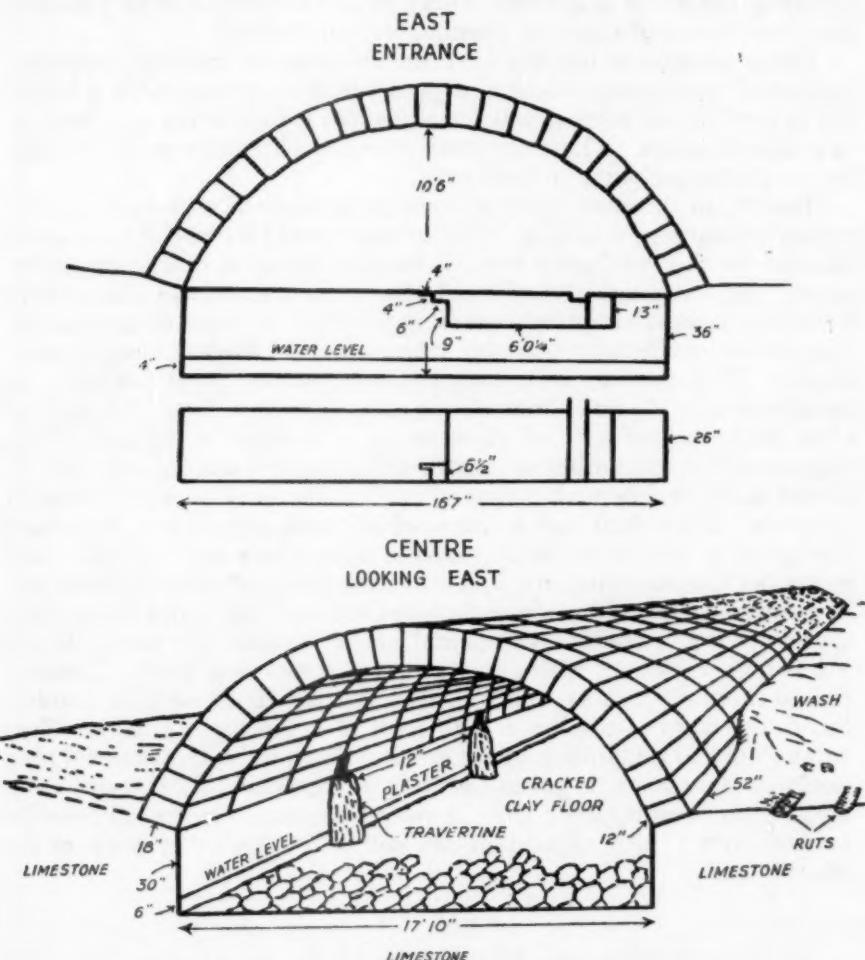


Fig. 4. The Roman cistern at Saf Saf.

of the reservoir, which is on otherwise open and rather featureless country, with no marked advantages in surface water-catchment.

There next arises the problem of the use of the water. Saf Saf lies over seven miles (in direct line) from Cyrene, and there are several intervening small scarp edges. Thus any extensive use of Saf Saf water would have involved some form of artificial lift from the cistern to a high-level aqueduct (assuming gravity flow, without any siphoning),

or else extensive tunnelling over several miles. Alongside the cistern there appeared to be no signs either of any deep tunnel or of an aqueduct, and the western (Cyrene) end of the cistern wall, although much damaged, showed no signs of any construction for the lifting of water. The eastern end, on the other hand, which is quite entire, showed definite hollows and pierced holes in the stonework, suggesting a former wooden structure. Moreover, the small size of the cistern—yielding a maximum of 150,000 gallons at most—would hardly appear to justify the building of an elaborate channel leading to Cyrene, since a continuous flow could run off the entire contents in a very few days.

We therefore advance the opinion that Saf Saf played no part in furnishing a water-supply to Cyrene, but served purely local agricultural needs, with water led off towards the east. The existence of the *foggara*, previously referred to, trending more or less directly from Cyrene towards the Saf Saf area, may be an argument against this view ; but our opinion is that topography provides the final answer—no simple unaided flow could have been developed, and the size of the cistern would not seem to have justified more elaborate works.³

Historic Climate. The existence of numerous and varied devices for conserving water naturally raises the question of whether climatic conditions in Classical times were substantially similar to those of to-day. Direct references of a literary kind are confusing. Herodotus recounts the difficulties of establishing the first Greek settlements in Libya, and tells of the Oracle at Delphi speaking of "cattle-breeding Libya"—a possible indication of a semi-arid regime. Pindar, on the other hand, mentions a "Libya of broad meadows"; and alongside this, we have the more solid economic fact that in Classical times Libya undoubtedly supplied important quantities of grain to Rome. This, together with the impressive scale of building in Cyrenaica, suggests a community far wealthier than the present inhabitants of Cyrenaica.

As against such views, we must, however, set the preoccupation of the ancient inhabitants with water conservation, as shown by their great efforts for very small returns. We should also recall that present rainfall round Cyrene averages 400-500 mm. annually (just under 20 in.), and because of the altitude of the district, there is slightly less irregularity than elsewhere in the country. Yet if climate had been any wetter in the past—giving an annual rainfall of 20 to 25 in. at least—would all the tanks, catchment pavements and aqueducts have been necessary?

One further point may be relevant. The scale of construction at Saf Saf appears to indicate that intense evaporation was an important climatic feature two thousand years ago, and thus point to a broad similarity with present conditions.⁴ It would however be well, before reaching any fixed conclusions, to discuss conditions on a wider basis than that afforded by observation in one restricted locality ; and, here, the weight of geographical evidence would generally suggest a broadly unchanged nature of Libyan climate during the last two or three millennia. With this, in the writers' view, the observations made round Cyrene are markedly in accord.

DERNA

Derna lies on the extreme eastern portion of a small coastal lowland, some five miles long by one and a half broad, that is closely hemmed in on three sides by steep scarps, and on the north by the sea. The town itself is in a very real sense an oasis, since its existence depends entirely on irrigation from springs that rise a short distance to the south in the Wadi Derna. According to J. W. Gregory⁵ the yield from these springs is 6 million gallons per day—a figure far higher than for any other springs in Cyrenaica. A chief aim of the visit to Derna was the preparation of a detailed land use map; but as space and other considerations do not allow a reproduction of the results obtained, brief mention will be made of two other matters—structure and types of cultivation. A report is to be made elsewhere on the botany of the Derna area.

The coastal plain of Derna owes its occurrence to downthrow northwards along a great east-west running fault that can be traced westwards from the Gulf of Bomba. Over most of its length, the fault-scarp drops directly into the sea, giving a sheer coastline, but for five miles near Derna there is an enclave of lowland, with the scarp some distance inland. As a result, communications from Derna are forced away from the coast, and there is a difficult section of road both to the east and west of the town.

The geology of Derna is simple. Basically, the whole area consists of a block of Eocene limestone, with a few Oligocene and Miocene outliers, and one or two local deposits of Pleistocene age. The various rock series are well exposed both on the northward facing slopes of the scarp face, and along the course of the Wadi Derna, which strikes inland due south of Derna. In the latter area, the succession of dazzling creamy 'Derna Limestone' (Lower Eocene) banded with calcareous marl, and capped by much brownish 'Slonta Limestone' (Upper Eocene), is particularly well revealed. A deposit on one side of this Wadi, of calcareous tufa of Pleistocene age and over 100 feet in thickness, appeared to be a remnant of an old deltaic fan; and its presence suggests the possibility of an oscillation of sea level of the order of more than 100 feet. Further evidence of such oscillation was provided by the occurrence of several distinct marine terraces on the coastal plain, and at least three sets of alluvial terraces on the sides of the Wadi Derna.

Cultivation in Derna depends almost wholly on irrigation, and as there is no attempt at artificial lift or high-level storage, agricultural development is conditioned by the altitude of the springs, and the nature of the terrain. The terraces, both marine and riverine, offer the best potentialities, and in the neighbourhood of the Wadi opening are intensively developed; but where free gravity flow of water is not possible, then the land remains largely unused.

Maize, and various species of millet, with some wheat and barley are the main cereal crops, but any detailed estimate of the relative importance of cereals as compared with other crops is difficult, owing to the frequent practice of intersowing cereals with vegetables, and also



1. VIEW FROM CYRENE: LOOKING NORTHWARDS



2. A BUILT TOMB (LATE STYLE)



3. APOLLONIA: THE PORT OF CYRENE



4. WATER TANK AND INLET

The extreme westerly of the tanks shown in Fig. 3



5. DERNA FROM THE SOUTH



6. DERNA FROM THE NORTH

showing the opening of the Wadi Derna, and the empty river bed. Three days after this photograph was taken, the first autumnal rains filled the river bed to a depth of seven feet

with tree-crops such as dates, pomegranates, figs and oranges. Almost certainly because of difficulties with water-supply, cereal growing is largely confined to the lower (i.e. marine) terraces, with fruit-trees increasingly predominant as slightly higher levels are attained.

The use of irrigation water allows the planting of cereals at different times, and as many as six stages of growth of the same cereal could be observed within one plot. The lowest and most humid areas (which were also those sheltered from the strong sea-breezes of summer) are occasionally given over to banana growing; but the leading fruit-tree in Derna is the date-palm—so much so that ownership of the more productive trees is regarded as conferring some social ‘standing.’ The profusion of date-palms, both scattered and in groves, gives the town a characteristic appearance.

Other field crops, less important than cereals, are various kinds of vegetable for human consumption—artichokes, aubergines, beans, sweet and ordinary potatoes, tomatoes, parsnips, and squashes—and also some turnips and green fodder for cattle. As is frequent in the Middle East, the cattle of Derna are partly stall-fed, and turned out to pasture on the natural scrub only occasionally.

On the higher terraces, which are often artificially levelled, but sometimes not, the pattern of cereals, vegetables, and fruit-trees is gradually replaced by tree cultivation, with emphasis on the vine and olive. The latter, however, does not thrive particularly well in Derna, since the climate is very humid in summer; but vines do much better, and Derna grapes are excellent—amongst the best in the eastern Mediterranean. Until 1951 the town had a well-established and slowly expanding wine trade, but the recent prohibition of alcohol in Libya (as noted in Part I) has struck a severe blow at what was promising to be a significant activity in the district. At the time of our visit areas of vines on the higher slopes were showing signs of neglect; but the trellised vines within the town, which produce eating grapes, were very productive.

Derna, with its gardens, sandy beach, and running water is undoubtedly from many points of view the pleasantest town within Cyrenaica; and its geographical advantages of a fairly flat, low-lying terrain, and the presence of subterranean water near by, suggest that with a little effort, further expansion of agriculture could take place. There is a scheme of land use highly characteristic of the Middle East—a bewildering intermixture of plants at several stages of growth within very small plots of ground, and almost a ‘tier’ of production. Dates occur well above soil-level, paralleled to some extent by the vines and olives of the scarplands; whilst fruit bushes and trees occupy an intermediate position, with cereals and vegetables nearest the ground.

LAND USE MAPPING

Here, in conclusion, we may refer to the difficulty of such a distribution for the geographer who may attempt a map of land use. The classification adopted by the Committee sponsoring the World Land Use Map calls for a distinction between ‘garden,’ ‘cereal,’ and ‘tree-

crop' cultivation ; but for an area such as Derna, only an intermingling of symbols could answer. Moreover, the tiny size of holdings, and fragmentation of types of cultivation, demand a base-map of very large scale—not 1 : 50,000, but, to be effective, of at least 1 : 10,000—if a picture of reality is to be obtained. Thus we arrive at a final lesson from the visit to Cyrenaica : the necessity of adapting the technique of land-use mapping to radically different objectives.

Photographs 1, 3, 5, 6, by G. W. J. Mortimer ; 2, by I. R. Fraser ; 4, by W. B. Fisher.

¹ HYSLOP, C. G. C., and APPLEBAUM, S. Cyrene and Ancient Cyrenaica. Tripoli, N.D. P. 2.

² GREGORY, J. W. Cyrenaica. *Geographical Journal*, 1916, 47 : 327.

³ Connected with this is the problem of exactly how many inhabitants lived within ancient Cyrene. The small quantities of water available suggest the conclusion that the population numbered not more than 15,000-20,000.

⁴ During the stay of the Expedition in the Cyrene area, it was noted that as much as three inches could be evaporated from the surface of a bucket of water within a period of twelve hours. Evaporation was, of course, strongest when a southerly air stream prevailed.

⁵ GREGORY, J. W. *Op. cit.*, p. 325.

A RELIC OF THE SCOTTISH NATIONAL ANTARCTIC EXPEDITION

An interesting relic of the Scottish National Antarctic Expedition of 1902-1904—led by Dr W. S. Bruce—has turned up on North Island, New Zealand. On 7th September 1952, Mr P. Larsen, a former member of the Royal New Zealand Air Force, found one of the many bottles set adrift by Bruce as 'floaters' to test the set and speed of the surface currents in the Southern Ocean. Recoveries of others of these bottles in the years following the expedition were noted in *The Scottish Geographical Magazine* in 1906 and 1907. Two of these were recovered on the coast of Victoria, Australia, and imply minimum average drift speeds, over direct courses, of approximately 8½ and 10 nautical miles per day. In reality the speed of the surface current from west to east in the Southern Ocean is probably considerably greater than these figures indicate.

The interest of this latest recovery is that it probably constitutes the record for the longest known point-to-point sea journey made by an uncontrolled floating object. Doubtless it has lain many years undiscovered among the sand dunes where it was found some three miles south of the mouth of the Rangitikei River, and nearly 200 feet above the present high-water level. Its discovery now appears to have been due to the erosive effect of recent heavy westerly gales on the dunes.

The remains of the leaflet enclosed in the bottle were, by directions which were still readable, sent to the British Admiralty by the finder. They have been mounted and are exhibited in the rooms of the Royal Society of Edinburgh. J. B. T.

REVIEWS OF BOOKS

EUROPE

Climate and the British Scene. By GORDON MANLEY, M.A., M.Sc. 8½×5½. Pp. xviii+314. 75 maps and diagrams. 41 colour photographs by Cyril Newberry and others. 40 photographs in black and white. [The New Naturalist, 22.] London: William Collins, Sons and Co. Ltd, 1952. 25s.

Readable, informative, explanatory and thought-provoking, this fine volume in *The New Naturalist* series succeeds in covering exactly the ground that one hoped it would. In achieving this result, it incorporates a very great deal of original work, and it is almost a model of what can be produced by combining the synoptic ability of the professional geographer with the knowledge of the specialist. Professor Manley gives the information and rarely misses the opportunity of suggesting how that information can be turned to practical account. Perhaps the only fault that can be found is that the puckish humour which generally enlivens the book occasionally (e.g. on p. 289) descends into the irritating banality of the private joke.

The specially photographed colour pictures, mainly by Cyril Newberry, deserve particular mention.

F. H. W. G.

Explorer's Scotland. By MARTIN THORNHILL. 8½×5½. Pp. 232. 35 illustrations. End-paper map. London: Skeffington and Son Ltd, 1952. 15s.

It behoves the reader to go warily when exploring Scotland with Mr Thornhill, for there are many inaccuracies and mis-spellings in this otherwise very readable book. For instance, James IV died at Flodden in 1513, not in 1533. Killin does not "straddle the River Tay," nor is Holyrood Palace the meeting-place of the General Assembly of the Church of Scotland. The Long Island is not only Lewis-and-Harris. The Scottish readers will also be startled to be told that the correct pronunciation of Glamis is "Glarms." But there is an excellent chapter on the work of the National Trust for Scotland and much information on old Scots customs and curiosities. The photographs, too, are satisfactory.

I. W. H.

Country Life Picture Book of Scotland. 11½×9. 59 plates. London: Country Life Ltd, 1952. 12s 6d.

This collection of large plates illustrating various aspects of the Scottish mainland is suitable as a gift-book. To say that the illustrations are excellently reproduced from camera studies by Robert M. Adam, G. Douglas Boulton, Alfred Furness, Alasdair Alpin MacGregor, W. A. Poucher, and other noted photographers is sufficient recommendation.

I. E. C.

The Drove Roads of Scotland. By A. R. B. HALDANE. 8½×5½. Pp. xiii+266. 17 plates. Map of drove routes. Edinburgh: Thomas Nelson and Sons Ltd, 1952. 25s.

We are greatly indebted to the author for his authoritative, exhaustive, and long-awaited account of one of Scotland's great historic 'trades,' a trade which played a fundamental part in the rise of an industrial population in Britain, and which marked the watershed of Highland economic history. After tracing the origins of droving in the Privy Council Records and describing the social history and economics of the trade, Dr Haldane passes to a detailed and very valuable account of the four main systems of drove roads which converged upon the autumn trysts at Crieff, and later at Falkirk. With this part of the work is associated the separate folded map on a scale of 10½ miles to 1 inch. A chapter is devoted to the trysts themselves, and is followed by others on the Border and English roads, on the coming of the sheep to the Highlands, and on the decline of the driving trade in the mid-nineteenth century. This book is a tribute both to the drovers and to its author. For not only does it stress the high moral status which the Scottish drover necessarily acquired in his trade, but it represents the fruits of a patient pursuit of the documented facts and of a careful 'field study.' The bibliography will prove invaluable to scholars.

A. G. M.

Garth and Glen Lyon. Edited by DONALD PATTON, M.A., B.Sc., PH.D., F.R.S.E., and ARTHUR CROMAR, M.A., LL.B. $7\frac{1}{2} \times 4\frac{1}{2}$. Pp. 48. 18 illustrations. 2 sketch maps. Edinburgh: The Scottish Youth Hostels Association, and The Scottish Field Studies Association, 1952. 1s 3d.

In addition to information anent the Hostel of Garth, this booklet contains an outline of the archaeology of Upper Tayside by Dr Margaret E. C. Stewart, of the history of the Garth district by James Young, geology by Dr Basil C. King, botany by Dr Ronald Patton, fishes of the Tay river system by T. A. Stewart, and birds and mammals by Colin Murdoch.

I. E. C.

Edinburgh and the Lothians. Edited by THEO LANG. $8 \times 5\frac{1}{2}$. Pp. xiii+282. 121 illustrations. End-paper maps. [The Queen's Scotland.] London: Hodder and Stoughton Ltd, 1952. 15s.

The outstanding feature of this richly detailed and well illustrated volume is a simple system of cross-reference which does away with the tedious 'routes' of orthodox guide-books. Three-fifths of the book present a very up-to-date record of the city, with some pertinent things to say about current problems of its improvement and preservation. The remainder is taken up with fine pen-sketches of Lothian towns and villages—also subject to cross-reference and so of use to the tourist. The end-paper maps are adequate, but their value is impaired by being folded into the binding.

A. G. M.

London. By JACQUES BOUSSARD, with the collaboration of H. J. STENNING. $9 \times 6\frac{1}{2}$. Pp. 210. Photogravures. Plan. London: Nicholas Kaye Ltd, 1951. 21s. New York: McGraw-Hill Book Co. Inc.

An apparent oversupply in recent years of books on London does not militate against appreciation of M. Boussard's excellent survey of the present-day urban scene viewed as an accrescence through bygone centuries. This readable presentation of familiar and of less well-known aspects of London is illuminated by numerous and exceptionally good photogravures. As an introduction to London, or as a souvenir, and as an example of gratifying book production, this volume is commendable.

I. E. C.

In Search of London. By H. V. MORTON. $7\frac{1}{2} \times 4\frac{1}{2}$. Pp. vii+440. 16 gravure plates. End-paper sketch maps. London: Methuen and Co. Ltd, 1951. 12s 6d.

Apart from an excursion to Greenwich and one upstream to Hampton Court, the subject of H. V. Morton's moving and satisfying book is really London, old and central London, through which he wanders, meditating and recalling that what we see now is but the latest manifestation of other Londons: to live here is to plunge into ancestor-worship. And what a wealth of tradition and history he provides, of great scenes and names famous or infamous from Roman times down to our own day! Even when the author's stories are more or less familiar, they resemble several of the pleasing gravure plates in presenting themselves from a new and unexpected angle.

R. T. C.

London West of the Bars. By DOUGLAS NEWTON. $8\frac{1}{2} \times 5\frac{1}{2}$. Pp. viii+336. 49 illustrations. Map. [The County Books.] London: Robert Hale Ltd, 1951. 18s.

This *County Book* deals with that part of London extending from Temple and Holborn Bars to Kensington and from the Thames to Notting Hill. This is an area of infinite variety in tradition, history, and atmosphere, and Mr Newton knows it intimately and loves it. A book with such a subject cannot fail to interest, and yet the work is not altogether satisfactory. Its author dodges with bewildering rapidity through space and time, which can only confuse a reader not really familiar with the area. His topographic and historical sense are sometimes at fault and his denominational bias is frequently irritating. The illustrations are excellent.

H. P. W.

The First Version of the Topography of Ireland by Giraldus Cambrensis. Translated by JOHN J. O'MEARA, M.A., D.PHIL. $7\frac{1}{4} \times 4\frac{1}{4}$. Pp. vi+121. 5 plates. Dundalk: Dundalgan Press (W. Tempest) Ltd, 1951. 8s 6d.

Giraldus de Barri, Norman-Welsh priest, Latin scholar and writer of distinction, in 1183, and again in 1185, visited Ireland, where his family played the major part in the conquest. His impressions of the country, its peoples, and its history, recorded in *Topographia Hiberniae* and *Expugnatio Hiberniae*, are writings of unique value for this period of Irish history, in the relative absence of other contemporary chronicles. Dr O'Meara has given us a new translation of the original text, conveying much of the vivid, pungent style of Giraldus. The foreword, a set of notes, and reproductions of twelfth-century illustrations, all add to the value of the book for the general reader. Despite the many incredible 'traveller's tales' and frequent moralisings, the *Topography* is most interesting.

E. V. L.

Ireland and the Irish. By CHARLES DUFF. $8\frac{1}{4} \times 5\frac{1}{4}$. Pp. 288. 4 figs. 44 illustrations. Decorative end-paper map by S. Horne Shepherd. London and New York: T. V. Boardman and Co. Ltd, 1952. 15s.

This beautifully illustrated book is strongly recommended and is one to be read before visiting Ireland. The account of the country and its history and folklore combines the scholarly—for the serious student desirous of knowing the background of the people—with racy descriptions of the places which attract by the beauty of their surroundings. The author has captured and given forth the essential spirit of a lovable people. Characteristic anecdotes abound and bring to life the people and scenes so vividly described by the facile and witty pen of the author. G. M.

Mourne Country : Landscape and Life in South Down. By E. ESTYN EVANS. $10 \times 7\frac{1}{4}$. pp. xii+226. 93 figs. 17 plates. End-paper map. Dundalk: Dundalgan Press (W. Tempest) Ltd, 1951. 32s 6d.

"To trace in the intimacy of a small and well-loved region the physical components and human responses which make up the Irish countryside," is the author's aim; he is brilliantly successful, largely because his material is drawn from personal observations in the field over a long period. The photographs, maps and drawings—these mostly by the author—are wonderful illustrations of a text that is always clear and interesting. Professor Evans first describes the evolution of the physical landscape, with its bold contrasts of mountain, lowland and seacoast. Then follow chapters dealing with climate and vegetation, "birds, beasts and fishes," archaeology, legends and history, culminating in accounts of human activities. The fertility of the plains is largely man-made, and isolation has influenced the Mourne peoples from the earliest times. Professor Evans writes: "It is the walker and the mountain climber, the golfer, fisherman, sportsman, naturalist, archaeologist, and the lover of quiet country scenes who are attracted to the Mournes." All these, and the readers of this book, will assuredly support his plea for the establishment of the Mourne Country as a National Park. *Mourne Country* is a book to buy, to read, to cherish—it should lead to a phenomenal increase in visitors to this delectable region.

E. V. L.

North Norway : A History. By FRANK NOEL STAGG. Foreword by Professor A. H. Winsnes. $8\frac{1}{4} \times 5\frac{1}{4}$. Pp. 205. 16 plates. End-paper map. London: George Allen and Unwin Ltd, 1952. 18s.

Nordland, Tromsö, and Finnmark are among the most interesting parts of Norway, mountainous but fertile in parts, and until recent years accessible almost solely by sea. Mr Stagg knows the country well, both in peace and war, and has compiled a history from the earliest times to post-war days. His work is full and accurate, and is especially illuminating on the relations between Norway and Russia in this northern territory. A wider geographical background would have made a more readable book, but would also have added to the bulk. Some of the final chapters seem more like a guide-book than a history, but are nonetheless most interesting.

R. N. R. B.

Suomi—Finnland: Land und Volk im hohen Norden. By W. EVERE. $7\frac{1}{4} \times 5$. Pp. 167. 30 figs. 31 photographs. 48 tables. Map. [Kleine Länderkunden.] Stuttgart : Franckh'sche Verlagshandlung, 1950. DM 9.80.

A condensed but comprehensive survey of the physical, human, economic, and regional geography of Finland, with satisfactory text-figures and photographs, and with interesting statistical tables. The bibliography is restricted to 38 references, preponderantly to German literature. J. H. K.

The Bailiwick of Guernsey. By C. P. LE HURAY. $8 \times 5\frac{1}{4}$. Pp. xii + 275. 125 photographs. End-paper sketch map. [The King's Channel Islands.] London : Hodder and Stoughton Ltd, 1952. 15s.

An up-to-date account of Guernsey, Lihou, Jethou, Herm, Sark, and Alderney is welcome, especially when it is as well written and illustrated as is Mr Le Huray's excellent book. Copious data concerning the islands, particularly historical details, are readably presented. The arrangement of the subject matter, however, would seem to be somewhat 'bitty,' and a few of the headings—Ichabod, Shape of Things, Always with You, Some Interesting Facts, Tread Lightly Here—unsuited to the genre of the book. J. H. K.

Sea-Girt Brittany. By GEORGE RENWICK. $8\frac{1}{4} \times 5\frac{1}{4}$. Pp. 160. 17 illustrations. End-paper sketch map. [Windows on the World.] London : Evans Brothers Ltd, 1951. 12s 6d.

George Renwick's contribution to the *Windows on the World* series makes an exquisite introduction to a charming region of 'La Belle France.' It is not too full of historical and architectural detail : delightful monographs of each part of Brittany are illustrated with excellent photographs. The author not only describes the cultural landscape but explains some of the captivating customs of a Celtic 'pays.' J. B. C.

Alpine Glaciers. By A. E. LOCKINGTON VIAL. $10 \times 7\frac{1}{4}$. Pp. 126. 7 diagrams. 84 photographs. London : Batchworth Press Ltd, 1952. 30s.

In this book, the author's interests in photography and glaciology are joined most satisfactorily. The text is well written and balanced, considering not only general and particular aspects of the subject but also associated topics of wider appeal. The numerous photographs are most informative, their quality and choice reflecting Mr Vial's skill as a photographer, and appreciation of form as a glaciologist. R. C.

The Balearics : Majorca, Minorca, Ibiza. By ERIC WHELTON. $8\frac{1}{4} \times 5\frac{1}{4}$. Pp. x + 276. 34 illustrations. 4 sketch maps. London : Robert Hale Ltd, 1952. 21s.

The first fifty pages are taken up mostly with a description of Barcelona, the door-step of the Balearics. Thereafter the book is divided into sections dealing with Majorca, Minorca, and Ibiza. In addition to a general history of the group there is a history of each island. The islands are described in great detail, and the narrative is enlivened by the author's personal touch and by his impressions. At the end there is a list of hotels, notes on food, wines, etc., communications, Spanish terms for food, and a bibliography. The illustrations are excellent. The book is delightful to read and a *sine qua non* for the visitor to the islands. H. S.

Florence. By EDWARD HUTTON. $8\frac{1}{4} \times 5\frac{1}{4}$. Pp. xv + 284. 33 illustrations. London : Hollis and Carter Ltd, 1952. 21s.

Hutton on Florence should be as well known as Hutton on Rome. The author heaves a deep sigh for the glory that the war destroyed in "the most beautiful city left in the world." Geographically, emphasis is placed on its important position at the ideal crossing-place over the Arno: the nodal point of central Italy. The simple and the complex in the Florentines are summed up. The author describes, as if he loves every stone, the piazzas, galleries, palaces and churches, and supplies a mint of historical information. The neighbourhood of Florence is also included. The illustrations are excellent, but the lack of a plan of the city is a drawback. H. S.

INDIAN OCEAN

The Indian Ocean. By ALAN VILLIERS. 9×6. Pp. 255. 33 plates. 10 sketch maps. Decorative end-paper map. London: Museum Press Ltd, 1952. 21s.

A well-written, entertaining and informative book by an author with a large store of personal experiences in the changing seascapes of the Indian Ocean. Although telling of his adventures on board overcrowded Arab dhows trading between Kuwait and Zanzibar in the late 1930's, and of the squadron of landing craft he commanded during the combined operations in SE Asia at the close of the second world war, Villiers never allows his work to become obtrusively autobiographical. The central figure of the story throughout is the Indian Ocean itself, whether in 'flying fish' mood of the Trades or boisterous mood of the Westerlies. Portuguese and Hollanders, the French and John Company struggle for its mastery; steamships replace East Indiamen and Clippers on its highways; slavers, pearlers, whalers and pirates have their day; the navies of Atlantic and Pacific lock in mortal combat on its waters in two world wars, but when the patterns change and all is told the ocean in all its fascination reigns supreme.

W. K.

Island of the Swan: Mauritius. By MICHAEL MALIM. 8½×5½. Pp. viii+232. 16 illustrations. London: Longmans, Green and Co. Ltd, 1952. 16s.

Mauritius was called Ilha do Cirne (Island of the Swan) by its Portuguese discoverers, as the author of this attractively produced travel-book reminds us in his introduction. The bulk of the volume records Mr Malim's impressions of the island and its peoples—French, Hindu, Moslem, Creole, and Chinese. Social and political issues are touched upon with humour and insight, and there are tantalising glimpses of the local flora. The illustrations support the text admirably, but unfortunately there is no map.

A. J. W.

AFRICA

The Beauty of Morocco: An Introduction and a Guide. By ROM LANDAU. 8½×5½. Pp. 167. 17 illustrations. End-paper sketch map. [Windows on the World.] London: Evans Brothers Ltd, 1951. 12s 6d.

This book covers all that the inquiring visitor desires. The towns, scenery, people and their customs are described against a background of the history of Moorish civilisation so different from the Europe that is only a dozen miles away and with which it has at the same time many lingering echoes. Valuable are the hints to travellers on how to comport themselves in Morocco—an aspect too often ignored by the visitor—and there are practical suggestions on money matters, hotels, meals, passports and visas for the different zones, and on the various routes to the country. An essential book for the visitor, and a delight for the arm-chair traveller. H. S.

The Gambia: The Story of the Groundnut Colony. By Lady SOUTHORN. Foreword by Sir John Gray. 8½×5½. Pp. 273. 4 plates. Map. London: George Allen and Unwin Ltd, 1952. 21s.

Lady Southorn, whose husband was Governor of Gambia from 1936 to 1942, writes of that territory with a large love. Most of the volume is historical, but it is a history that can bear re-telling: the grim truth of James Island is truly stranger than any fiction. For the rest, the material is that collected by a gracious Governor's lady, and while no serious analysis of the Gambian scene emerges, a vivid picture is drawn of the sights, sounds and scents of not the least charming, if the smallest, of our West African territories. There are a few photographs and a quite serviceable map.

R. M.

Eritrea on the Eve: The Past and Future of Italy's 'first-born' Colony, Ethiopia's ancient Sea Province. By E. SYLVIA PANKURST. 8½×5½. Pp. 72+iv. 28 plates. 3 sketch maps. Woodford Green: 'New Times and Ethiopia News' Books, 1952. 7s 6d.

Much of the information in this book has appeared in the author's *Ex-Italian Somaliland* [see S.G.M., 68 (2): 89]. After sixty years of Italian rule and ten years

of British 'caretaker' administration, Eritrea is being federated with Ethiopia. The book is partly historical and partly an indictment of the caretaker administration who, for no valid reason, destroyed much of the valuable port and other installations prior to handing over the country to Ethiopia, an ally in the war. A book of considerable interest, with many pictures of the destruction carried out.

J. M. M.

Tomorrow's a Holiday. By ARTHUR LOVERIDGE. 8½×5½. Pp. 303. 17 illustrations. End-paper sketch map. London : Robert Hale Ltd, 1951. 18s.

The author collected nearly 3000 frogs and over 2000 snakes, not to mention 700 mammals and 800 birds, in the course of journeys up and down East Africa, visiting all three of the great Lakes. This book is an account of the work and, as might be expected, will interest the naturalist much more than the layman. With his long experience of trekking in East Africa the author gives a deceptive appearance of ease to his long wanderings, and we can only admire the aplomb with which he copes with fifty porters, dilatory and incompetent lorry drivers, and burglars, and at the same time collects specimens.

R. M.

Moçambique. By OLIVEIRA BOLÉO. 9×6. Pp. 562. 3 figs. 95 photographs. 15 sketch maps. [Monografias dos Territórios do Ultramar.] Lisboa : Agência Geral do Ultramar, 1951.

The official publication of a new series of monographs dealing with the overseas possessions of Portugal will be appreciated by geographers and others interested in colonial studies. For readers unacquainted with the Portuguese language, adequate French and English summaries are provided. Dr José de Oliveira Boléo divides his book on Mozambique into three parts, in which the physical geography, biogeography, and human geography are surveyed. The latter part occupies about three-quarters of the volume and comprises sections on the native population, Portuguese colonisation, and on resources and economics of the territory. In addition to copious and detailed information given in the text, there are serviceable but unattractive sketch maps, suitable but poorly reproduced photographs, and 214 references to recent literature on the subjects of the twenty-four chapters of this useful monograph.

I. E. C.

AMERICA

Alaskan Odyssey. By BERNARD R. HUBBARD, s.j. 8½×5½. Pp. xii+198. 185 illustrations. 2 sketch maps. End-paper map. London : Robert Hale Ltd, 1952. 18s.

This book is a collection of articles by Father Bernard Hubbard, the "Glacier Priest," on some of his most spectacular explorations in the little-known region of the Alaska Peninsula and its still active volcanoes. The journeys were apparently made between the wars, but the dates are not very explicitly given. With two companions and two dogs he made the first ascent of "Smoky Moses," the 9000-foot volcano Shishaldin on Unimak Island. With the Alaskan flying aces, Frank Dorbandt and Harry Blunt, he flew over erupting volcanoes and little-explored territory in the Bristol Bay region, taking photographs. Father Hubbard is a particular friend of his sledge-dogs, and his accounts of these delightful animals are among the most charming parts of his enthralling and vigorous narrative.

I. W. H.

Arctic Trader : The Account of Twenty Years with the Hudson's Bay Company. By PHILIP H. GODSELL, F.R.G.S. 8½×5½. Pp. xv+320. 17 illustrations. London : Robert Hale Ltd. New edition, 1951. 15s.

The first edition of this book was reviewed in this *Magazine* in 1935 [51 (5) : 329]. In the intervening years much has been done in Canada and Alaska in opening up to trade almost untraversed country. Fur and minerals find a growing market, and the aeroplane brings easy access to distant lands, so that the isolated regions of Arctic Canada are now often visited and have become well known. The interest of the book is guaranteed by the call for a new edition, and the authority lies in the author's life-time in the far north. But why do the publishers not give even an outline map?

R. N. R. B.

Resources and Policy : Current Issues in Conservation. Edited by LEE S. GREENE and RENÉ DE VISMÉ WILLIAMSON. $9\frac{1}{2} \times 6\frac{1}{2}$. Reprinted from *The Journal of Politics*, 1951, 13 (3): 313-481. Gainesville, Florida : Kallman Publishing Company, 1951. \$2.00.

The essays constituting this authoritative symposium on the vital problem of conservation include a re-examination of Malthus' principle of population by Professor S. A. Cain, a discussion on opportunities for world abundance by Dr C. E. Kellogg, on education and demonstration in American forestry by Dr E. H. Clapp, on the significance of TVA by Professor N. Wengert, on legislative abdication in regional development by Professor H. C. Hart, on resource conservation and development problems and solutions in the Columbia Basin, on administration of Federal lands in the public interest by Dr Marion Clawson, and on the politics of conservation in the U.S.A. by Professor C. M. Hardin.

I. E. C.

The Ohio. By R. E. BANTA. $8\frac{1}{2} \times 5\frac{1}{2}$. Pp. 592. Illustrated by Edward Shenton. 2 sketch maps. [Rivers of America.] Edinburgh, Glasgow, and London : William Hodge and Co. Ltd, 1951. 15s.

Like the St Lawrence, Hudson, and Mississippi, the Ohio River has had its full share of romantic incident. The seat of high Indian cultures long before the arrival of the white man, this river valley has in a few hundred years changed, from a forest hunting-ground with a few plots of maize, to the industrial heartland of a continent. In a leisurely way, Mr Banta seems to have dealt with everything that has happened to the Ohio valley during the past three centuries. This book can be recommended to all who are interested in the colourful byways of American history ; the extensive bibliography testifies to its reliability.

A. M.

British Honduras : Past and Present. By STEPHEN L. CAIGER. $8\frac{1}{2} \times 5\frac{1}{2}$. Pp. 240. 2 sketch maps. London : George Allen and Unwin Ltd, 1951. 18s.

The author has succeeded in presenting a compact and readable history of the Colony from the days of discovery and buccaneering to the economic and political developments of the present time. The earlier history is necessarily based on Sir John Burdon's monumental work, *The Archives of British Honduras, 1670-1884*, but the bibliography indicates the wide range of sources studied. Each of the chapters—whether dealing, for instance, with Captain Peter Wallace, a native of Falkland and the founder of Belize, or with the recent controversy with Guatemala—is of absorbing interest. The author is keenly aware of the potentialities of British Honduras and discusses some of the implications of the proposed federation of the British West Indies.

I. E. C.

AUSTRALIA

Travels in North Queensland. By JEAN DEVANNY. $8\frac{1}{2} \times 5\frac{1}{2}$. Pp. 251. 25 illustrations. End-paper map. London : Jarrolds Publishers (London) Ltd, 1951. 16s.

Following a vivid description of the varied fauna and flora of the Great Barrier Reef, the major part of this book presents an account of the author's travels in North Queensland. She fulfils her purpose of demonstrating the immeasurable possibilities for the establishment of close settlements dependent upon mixed farming, in place of the present gigantic and frequently inefficient cattle ranches. Given improved communications, effective pest control, adequate fencing, and plant for dealing with meat, hides, fish, and the tremendous mineral wealth, the region could support many thousands of immigrants ; fine scenery and pleasant climate—throughout most of the year—should attract many tourists. The author cites examples of the intelligent industry of the Aborigines—in contrast with the stupid cruelty of their white exploiters. The book has much to interest the geographer ; but one shudders at "topmost" (extreme north) and "lower half" (southern half) of Cape York Peninsula. There are many excellent photographs, but no detailed map of North Queensland.

E. V. L.

BIOGEOGRAPHY

Ecological Animal Geography. By W. C. ALLEE and KARL P. SCHMIDT. 9×6. Pp. xiii+715. 142 figs. End-paper maps. New York : John Wiley and Sons, Inc. Second edition, 1951. \$9.50. London : Chapman and Hall Ltd. 76s.

Dealing in just proportion with the ecological distribution of animals in relation to marine, inland water and land environments, *Tiergeographie auf oekologischer Grundlage* (1924), by the late Professor Richard Hesse, has proved to be a work of basic interest to animal geographers. The first American edition (1937) was not merely a translation but considerably revised by the authors of the present new edition, in which new and old ingredients have been skilfully blended so as to constitute a new book. Numerous items have been amplified or added, and references to recent research have been incorporated in the chapter bibliographies. Many of the changes in the book are the outcome of consultations with specialists, and new text-figures have been inserted. Lists concerning the number of species in different regions have been modernised whenever possible, dates of recorded surveys being given. By no means the least important chapter in this indispensable volume is the last, dealing with the effect of man on the distribution of other animals and stressing the world-wide need for conservation.

J. H. K.

The Classification of West African Livestock. By I. L. MASON. Foreword by J. P. Maule. 8½×5½. Pp. vii+39. 38 plates. 2 maps. [Technical Communication No. 7 of the Commonwealth Bureau of Animal Breeding and Genetics, Edinburgh.] Farnham Royal: Commonwealth Agricultural Bureaux, 1951. 10s 6d.

The geographical distribution of types of live-stock in West Africa is, of course, correlated with the environment and the people who breed them. This publication not only serves as a guide for identifying the many different breeds met with, but is a source of information as to their nomenclature, characters, and geographical range. Tribal and place-names are given the English spelling where they are conventional or known, otherwise the French form is used. The illustrations and maps are apposite, and some sixty references are listed.

J. H. K.

The Birds of Tropical West Africa : With Special Reference to those of the Gambia, Sierra Leone, the Gold Coast and Nigeria. Volume Eight. By DAVID ARMITAGE BANNERMAN, M.B.E., M.A., SC.D., F.R.S.E. 10½×7. Pp. xxiv+552. 15 figs. London : The Crown Agents for the Colonies, 1951. 50s.

The author's monumental work, begun in 1928, on the avifauna of West Africa includes particulars of 1089 species and 448 subspecies or racial forms. As about 75 per cent. of the birds are represented also in other parts of Africa, the value of this mine of information to biogeographers and naturalists is obvious. In this final volume the previous volumes are brought up to date, and recent field observations are presented for the first time, with details of birds not previously included. Scientific names and vernacular or common names referred to throughout the work are fully indexed. Birds discovered since publication of the volume in which they would have been recorded are illustrated.

It is satisfactory to note that the author has completed a condensed edition of his *magnum opus*.

J. H. K.

POLITICAL GEOGRAPHY

World Political Geography. By G. ETZEL PEARCY, RUSSELL H. FIFIELD, and Associates. 9½×6½. Pp. xv+653. 139 figs. by Robert J. Voskuil. London : Constable and Company Ltd. Fifth printing, 1951. 45s.

The geographical aspects of the motivation of power politics are competently surveyed in this volume, first published in New York in 1948 [see S.G.M., 66 (1) : 55]. Subsequent events would seem to justify modifications here and there of the text and also bringing the bibliography up to date. Nevertheless, the book is indispensable to readers interested in world affairs. The issue of the fifth printing in London will render this American work more accessible to students of political geography in Britain.

I. E. C.

BIOGRAPHY

Twelve Men of Plymouth. By GERALD HAMILTON-EDWARDS. $8\frac{1}{2} \times 5\frac{1}{2}$. Pp. 96. 8 portraits. Vignettes by J. Rudkin Chart. End-papers from an engraving by J. Thomas. Plymouth : Gerald Hamilton-Edwards, 1951. 7s 6d.

Of the twelve men whose lives are covered by this book, it is hardly surprising that five should be seamen, but few could expect four to be artists. To these and other Plymouthians of lesser calibre Mr Hamilton-Edwards has paid a happy tribute.

C. R. V. G.

Hans Egede : Colonizer and Missionary of Greenland. By LOUIS BOBÉ. $10\frac{1}{2} \times 7$. Pp. 207. 44 figs. Frontispiece. 2 coloured plates. Hans Egede's map of Greenland, 1737, in 9 colours. Copenhagen : Rosenkilde og Bagger, 1952. Kr. 24, or 26s.

English-speaking peoples as well as Scandinavians have always shown much interest in Hans Egede, the 18th-century "Apostle of Greenland," who was one of the first great Protestant missionaries. In 1945 Professor Louis Bobé, Historiographer-Royal of Denmark, published in Danish his life-long study of this famous man, of which this book is the abridged translation. In the face of repeated obstacles which might well have broken his heart, Hans Egede wrought out the youthful purpose conceived in his distant Lofoten parish one night in 1708, and in 1721 landed at the spot now dominated by his statue on the west coast of Greenland at Godthaab, to bring Christianity to "these poor ignorant people."

Dr Bobé has based his work upon Hans Egede's diaries as well as his own research and travel in the missionary's footsteps. Though the translation is rather imperfect, it cannot detract from the deep interest of the narrative.

I. W. H.

An Explorer-Scientist's Pilgrimage : The Autobiography of WILLIAM HERBERT HOBBS. $8\frac{1}{2} \times 5\frac{1}{2}$. Pp. 222. 16 plates. Ann Arbor, Michigan : J. W. Edwards Inc., 1952. \$3.75.

No geologist, or we may equally call him a geographer, has travelled more widely than Professor Hobbs. His field work on glacial deposits and mountain structure took him to every continent, and brought him at length in his later years to the Greenland ice-cap. Moreover, he had a passion for attending congresses and communal gatherings of all kinds. He is widely known to British men of science, and contributed many papers to scientific periodicals, including two papers to the *S.G.M.* (1908, 1914). In recent years he dabbled in the early history of the Antarctic, with not very happy results. All he succeeded in doing was to put forward a claim, which convinced no authority, of the falsity of Weddell's chart and of the priority in the discovery of Graham Land of American over British sealers. But this makes little difference in our thoughts of him as a genial, friendly soul, and we are glad to have his volume even if it is too short to do justice to such a versatile man.

R. N. R. B.

EDUCATIONAL

The Groundwork of Modern Geography. By ALBERT WILMORE, D.Sc., F.G.S., F.R.G.S. New edition revised by Ethel R. Payne, M.Sc. $8\frac{1}{2} \times 5\frac{1}{2}$. Pp. xii+403. 77 figs. 16 plates. London : G. Bell and Sons Ltd. Fourth edition, 1952. 20s.

Since its first publication in 1920, this book has appeared in 17 impressions—testimony to its essential soundness. This new edition retains the basic form of Dr Albert Wilmore's original work, but its value has been greatly enhanced by the incorporation of much new material designed to bring the book up to date and involving the virtual rewriting of several chapters. Recent statistics are employed in the main, all the photographic illustrations and some of the maps and diagrams are new, and in the Appendix, examination questions covering all sections of the text have been selected from recent papers ranging from School Certificate to London B.Sc. (Econ.) Degree, the majority being of Higher Certificate standard. The hope is expressed that these questions will stimulate the student "to thought which

may carry him beyond the limits of the book": the comprehensive bibliographies at the ends of chapters should help in this laudable object.

The book can be strongly recommended as the complete fulfilment of its aim: it furnishes the groundwork for advanced studies in the main branches of geography, and students using it will later have little to unlearn.

E. V. L.

Physical Geography. By R. F. PEEL, M.B.E., M.A. $7\frac{1}{2} \times 4\frac{1}{2}$. Pp. xiii+290. 65 figs. [Teach Yourself Geography.] London: English Universities Press Ltd, 1952. 10s 6d.

Professor Peel has succeeded in covering most adequately the various aspects of physical geography. This fascinating book affords a lucid exposition for a student beginning to explore geology as well as geography.

G. M.

Maps and Diagrams: Their Compilation and Construction. By F. J. MONKHOUSE and H. R. WILKINSON. $8\frac{1}{2} \times 5\frac{1}{2}$. Pp. xvi+330. 199 figs. London: Methuen and Co. Ltd. 25s. New York: E. P. Dutton and Co. Inc., 1952.

This advanced text-book, based upon the cartography courses of the Geography Department of Liverpool University, rightly begins with a meticulous description of the essential equipment, and how to gain proficiency in its use. Chapter II deals with Relief Maps and Diagrams—with the reminder that "the map must never be divorced from the ground"—including landscape drawing, field-sketching, and the construction of block diagrams. Other chapters indicate sources of raw material for maps and diagrams dealing with Climate, Economic Geography, Population, and Settlements, with intelligible descriptions of various methods of construction. The illustrations, culled from a wide range of sources, are—with rare exceptions—unusually clear, attractive, and illuminating. Helpful exercises are unobtrusively introduced into the text, and there are frequent references in footnotes to other books and articles of authority. A selected bibliography at the end of the book and additional exercises should appear in the next edition, which outstanding merit should soon ensure.

E. V. L.

The Homeland: Great Britain and Ireland. By R. W. BROOKER. $7\frac{1}{2} \times 5\frac{1}{2}$. Pp. 317. Illustrated. Maps and diagrams. London: George G. Harrap and Co. Ltd, 1951. 8s 6d.

This text-book is intended for those working for the various examinations at the level of the General Certificate of Education. The book is divided into five sections: one on the natural setting, one on the industrial and commercial life, and three on the regional divisions. The presentation of the matter is quite good, but for readers north of the Border there are several notable omissions. There is no mention, for example, of the importance of poultry farming to the Orkneys; information on hydro-electric developments in the Highlands is out-of-date. The agricultural chapter is thin in content, and there is little mention of beef cattle.

J. R. B.

Wales in Maps. By MARGARET DAVIES. $9\frac{1}{2} \times 7\frac{1}{2}$. Pp. 111. 97 figs. Map showing Welsh place-names. Cardiff: University of Wales Press, 1951. 7s 6d.

This is claimed to be "a collection of data" which the author suggests may be useful to secondary schools and others. Each page of illustration is faced by one of commentary, but although "whole books have been written on each of the major topics," no bibliography is given. Some of the maps are from published sources, others are original. Unfortunately, the reproduction is often poor. Fig. 31 claims to show land use by counties; the counties contain squares of curious patterns, but to these no key is given. Fig. 62 shows drove roads—hitherto unpublished—but the little black symbols are not explained. The commentary sometimes suffers from loose expressions, such as "The sea washes against three sides of Wales. It warms the land . . ." On the other hand, many teachers will be grateful for the series of maps illustrating farms, valleys, and town development. But it would have been so very much better had the book been more carefully produced even at a higher cost.

H. A. M.

GENERAL

Human Geography. By JEAN BRUNHES. Abridged edition by Mme. M. Jean-Brunhes Delamarre. Translated by Ernest F. Row, B.Sc.(ECON.), F.R.ECON.S. 10×7½. Pp. 256. 40 figs. 40 plates. London : George Harrap and Co. Ltd, 1952. 25s.

All-geographers—and many other readers—will welcome this beautifully produced edition of one of the greatest classics in the literature of Human Geography, capably translated from the 1947 French edition, which was itself an abridgement of the fourth edition (1934). The author himself shortly before his death in 1930 had planned such an abridgement. The new work retains all the valuable elements of the full text; certain adjustments in the material and the addition of a few passages from other writings of Jean Brunhes have given the book a more modern presentation. As in the 1947 French edition, all the photographic illustrations are assembled at the end of the text, and they are reproduced with conspicuous clarity. Everyone concerned in the production of this volume deserves our congratulations and grateful thanks.

E. V. L.

Social Evolution. By V. GORDON CHILDE, D.LITT., D.Sc. 7½×5. Pp. viii+184. London : C. A. Watts and Co. Ltd, 1951. 10s 6d.

This book is of considerable importance to geographers. Professor Childe examines critically the assumption that civilised societies have evolved from savagery along lines resembling the process of biological evolution according to Darwinian theory. An examination of the archaeological remains of prehistoric peoples of Europe, the Near East, and North Africa reveals a process of social evolution differing in many ways from the stage-by-stage development of living organisms. Three main factors emerge from this examination : divergence, convergence, and diffusion. Only the first, involving a differentiation from a parent society, resembles the process of organic evolution. The other two show no such resemblance. Many cultures show the effect of convergence, whereby assimilations of other cultures have resulted in profound modifications. In organic evolution, too, there is no means of transmitting the mutations of one species to another, but the inventions of one culture, new methods, new practices, have been diffused, in some cases rapidly, far beyond the geographical limits of the society.

S. C. F.

Ports and Harbours. By F. W. MORGAN, M.A. 7½×4½. Pp. 176. 12 figs. London : Hutchinson's University Library, 1952. 8s 6d.

Within quite small compass *Ports and Harbours* presents a full study of its subject, and the work can be strongly recommended. The history and economic function of ports are given, as also descriptions of the various types of ports, harbour works and installations. Space is found for chapters devoted to hinterlands and ports as industrial centres. A pleasing feature of this volume is that the author has cast his net over the entire world in quest of examples.

C. R. V. G.

Passenger Liners of the Western Ocean : A Record of the North Atlantic Steam and Motor Passenger Vessels from 1838 to the Present Day. By Commander (S) C. R. VERNON GIBBS, R.N. (Retd.). 8½×5½. Pp. 352. 57 illustrations. London : Staples Press Ltd, 1952. 30s.

This volume is the result of sixteen years of painstaking research into the history of the development of the North Atlantic passenger services. One is astonished at the number of shipping companies involved, there being approximately seventy of these included in the book, together with details of 768 ships from P.S. *Sirius* of 1838 to G.T.S.S. *United States* of 1952. Apart from being an excellent work of reference, the book contains historical notes on individual shipping companies and their ships, and these notes are written in a style which is readable and by no means dry as dust. Although the development of the propelling machinery can be gleaned from the text, another Appendix dealing briefly with this aspect would enhance the value of the book. The illustrations have been selected with care and many lesser known ships have been included, but the omission of well-known ships like the two *Queens* will be regretted by many readers.

W. A. F.

Sea Road to the Indies : An Account of the Voyages and Exploits of the Portuguese Navigators, together with the Life and Times of Dom Vasco da Gama, Capitão-Mor, Viceroy of India and Count of Vidigueira. By HENRY H. HART, F.R.G.S. 8½×5½. Pp. xii+296. End-paper sketch map. Edinburgh, Glasgow, London : William Hodge and Co. Ltd, 1952. 15s.

A most able and full account of the opening-up of the Cape route to India is offered by *Sea Road to the Indies*. A record of da Gama's activities is preceded by an account of the attainments of Dias and others working under the influence of Prince Henry the Navigator. Perhaps the most interesting chapter is that devoted to Pero de Covilhan, who, disguised as a merchant, reached Calicut by the 'overland' route and thereby demonstrated to the Portuguese king the possibilities of the Indies trade. A useful bibliography increases the value of this commendable book.

C. R. V. G.

Further English Voyages to Spanish America, 1583-1594. Documents from the Archives of the Indies at Seville illustrating English Voyages to the Caribbean, the Spanish Main, Florida, and Virginia. Translated and edited by IRENE A. WRIGHT, B.A., F.R.HIST.S. 8½×5½. Pp. xciii+314. 8 illustrations and maps. [Works issued by The Hakluyt Society, Second Series, No. XCIX, 1949.] London : The Hakluyt Society, 1951.

The present volume is the third of a series giving the Spanish version of the English incursions into the Spanish Main between 1527 and 1594, and deals with the final twelve years of the period. It consists of contemporary documents, most ably translated, and is prefaced by an excellent and comprehensive introduction. Maps and plans amplify the texts. The interest of this book lies not only in its unfamiliar viewpoint, but also in many of the Spanish factual representations, as for instance : "Don Alonso Bazan had an encounter with the English fleet off the island of Flores where the enemy lay in wait for the fleets. He took . . . one of the queen's good galleons, and the vice-admiral, named Richard Grenville. . . . He sank one of the king's old galleons and a flyboat. . . . He would have fled like the rest if Martin de Vertendona's galleon, which got the wind of him, had not torn away his foresail with the bowsprit."

C. R. V. G.

ATLASES

Cosmopolitan World Atlas. Preface by Andrew McNally III. 14×11. Pp. xvi+376. Chicago, New York, San Francisco : Rand McNally and Co. Second edition, 1951. \$12.50.

On the title-page of this atlas it is claimed that "as soon as Man thinks about anything that matters he must get an Atlas." If any geographer were prepared to support this statement, he would be tempted to add "but not this one," mainly because of the absence of relief maps—which there is only one, of the world on a scale of 1:81,000,000. The country and regional maps, which are politically coloured, show physical features by a system of hachuring reminiscent of our Victorian school atlases. They also show railways, but, in spite of the fact that some maps are on a scale of 1:850,000, no roads : in a modern atlas this is a drawback.

The compilers have, however, succeeded in including a large number of names and, particularly for the United States, the volume is a good reference work, the index system being straightforward and easy to use. The world distribution maps are well produced, and those of economic minerals are of particular interest. Tables of world statistical, geographical and economic information are also included, with a more detailed series for the United States. It is distressing to find under "Principal Discoveries and Explorations" that David Livingstone represents England.

J. B. F.

The Citizen's Atlas of the World. By JOHN BARTHLOMEW, M.C., M.A., F.R.S.E., F.R.G.S. 14½×10. Pp. xvi+200 (maps)+157 (general index). Edinburgh : John Bartholomew and Son Ltd. Tenth edition, 1952. £6, 6s.

The first edition of this well-known atlas, containing ninety maps, was published by George Newnes Ltd in 1898 at the price of 16s. Successive editions bear witness

to the sound development of the atlas and to the appropriateness of the title. In view of transport and political developments in recent years, the present edition shows very considerable revision. Among the innovations, the map ('Atlantis' projection) of the United Nations, and that showing international air-routes ('Nordic' equal-area projection) are welcome. The index of some 100,000 place-names has been carefully recompiled, and there is no doubt that the utility and popularity of the atlas are enhanced.

I. E. C.

Concise Oxford Atlas. General Editors : D. P. BICKMORE and K. F. COOK. $10 \times 7\frac{1}{2}$. Pp. viii+97 (maps)+clviii (gazetteer). London : Oxford University Press, 1952. 18s 6d.

Although largely based on the *Oxford Atlas* [see S.G.M., 68 (2) : 94], the *Concise Oxford Atlas* is not merely an abridgement. Map projections, scales and areas have been well selected, and the gazetteer incorporates not only certain population figures but also climatic data for some 250 stations. The physical map of Europe, by the way, shows four climatic stations in Eire but none in Scotland. Space does not permit assessment of individual maps, but the map showing scenery, national parks, etc. in Great Britain is especially welcome. The majority of the maps are political, the colouring, related to the present-day political *bloc*, being somewhat outré. On some maps names of rivers tend to be illegible in consequence, while others entail considerable eye-strain because of the minuteness of the lettering. Among the useful features of the atlas are the appended administrative gazetteer and an historical gazetteer of Great Britain and Northern Ireland. J. H. K.

Philip's Elementary Atlas. Edited by GEORGE GOODALL, M.A. $11 \times 8\frac{1}{2}$. Pp. xii+40 (coloured maps)+12 (index). London : George Philip and Son Ltd. Ninety-first edition, 1952. 4s 9d.

The London Geographical Institute and the Cartographic Editor are to be congratulated on this up-to-date edition of an elementary atlas of proved merit. May it be suggested that in future editions the symbols for certain towns (e.g. Dunoon, Helensburgh, Nice, Monaco, Spezia, Naples, etc.), shown one or two miles inland, should touch the coast-line, and that the spelling Rumania should be replaced by Romania ?

I. E. C.

Climatological Atlas of the British Isles. METEOROLOGICAL OFFICE. Preface by Sir Nelson K. Johnson. $12 \times 9\frac{1}{2}$. Pp. iv+139. London : H.M. Stationery Office, 1952. 52s 6d.

Each of the nine sections of this atlas consists of maps, preceded by an interpretation of the maps and explanation of the data upon which they are based, a good bibliography being included. Pressure, wind, temperature, precipitation, humidity, and sunshine are shown, and the penultimate section, on fog and visibility, is particularly interesting. The final short section on cloud contains no maps : the maps on bright sunshine may in part be regarded as *cloud amount* maps, but the text does not suggest why *cloud type* maps could not have been attempted.

From the point of view of cartographic art, the atlas is somewhat disappointing. Isopleth numbers appearing on the maps are too large, and are not always particularly well placed to make it clear to which isopleth they are referring. The frequent use of unattractive lettering, too, may be attributed to draughtsmen trained in the art of producing daily weather maps quickly rather than atlas maps. However, such criticism is not more than can be commonly made of pioneer work, and this atlas represents invaluable pioneering.

F. H. W. G.

An Atlas of Tudor England and Wales : Forty Plates from John Speed's Pocket Atlas of 1627. Introduced and described by E. G. R. TAYLOR. 7×5 . Pp. 32. 40 maps. [King Penguin, 61.] Harmondsworth : Penguin Books Ltd, 1951. 3s 6d.

Professor Eva Taylor introduces the maps delightfully into the landscape of the times, so that all might appreciate the fascination of old maps, even though it be for the first time. The coloured map plates of each country are effective facsimiles.

J. C. B.

PUBLICATIONS RECEIVED

EUROPE

The Surface Water Year-Book of Great Britain, 1937-45. By the MINISTRY OF HOUSING AND LOCAL GOVERNMENT. Foreword by Major-General G. Cheetham, C.B., D.S.O., F.R.I.C.S. 13×8. Pp. xii+134. London : H.M. Stationery Office, 1952. 17s 6d.

I Caratteri raziali della Nazione britannica. By H. J. FLEURE. Reprint : Archivio per l'Antropologia e la Etnologia, 1932, 62 : 19-25.

British Express Locomotive Development, 1896-1948. By EDWARD CECIL POULTNEY, O.B.E. Foreword by R. A. Riddles, C.B.E. 9½×7½. Pp. 175. Illustrated. London : George Allen and Unwin Ltd, 1952. 21s.

Scotland—The Wealthy Nation. By ARCHIE LAMONT, M.A., B.Sc., F.R.S.E., F.G.S. 8½×5½. Pp. 142. Sketch map. Glasgow : Scottish Secretariat Ltd, 1952. 1s 6d.

The West Coast of Scotland : Skye to Oban. By STEPHEN BONE. 9×7. Pp. 64+8 (coloured maps). Illustrated. [Shell Guides.] London : Faber and Faber Ltd, 1952. 12s 6d.

The Influence of Man and Animals on the Vegetation of Certain Hill Grazings in South East Scotland. II. By E. WYLLIE FENTON, M.A., D.Sc. 8½×5½. Pp. 84. 6 air photographs. Sketch map. Edinburgh : The Edinburgh School of Agriculture and The Edinburgh and East of Scotland College of Agriculture [Technical Bulletin No. 5], 1952.

Ecology and Correlation of the Pentlandian : A New Division of the Silurian System in Scotland. By A. LAMONT. Reprint : International Geological Congress, Report of the Eighteenth Session, Great Britain, 1948, Part 10 : 27-32.

Biological Types of Man in England and Wales. By H. J. FLEURE. Reprint : Vierteljahrsschrift der Naturforschenden Gesellschaft in Zürich, 1938, 83 (30) : 137-148.

The English Lakes. By F. G. BRABANT. Revised by B. L. THOMSON. 6½×3½. Pp. xii+237. 60 illustrations. Map. [The Little Guides.] London : Methuen and Co. Ltd. Fourth edition, 1952. 9s 6d.

Durham. By Sir TIMOTHY EDEN. 8½×5½. Vol. I. Pp. xvi+1-284. Frontispiece. Vol. II. Pp. viii+285-664. Frontispiece. Map. [The County Books.] London : Robert Hale Ltd, 1952. 18s per volume.

Worcestershire. By F. T. S. HOUGHTON. Revised by Matley Moore. 6½×3½. Pp. xii+178. 50 illustrations. Map. [The Little Guides.] London : Methuen and Co. Ltd. Third edition, 1952. 9s 6d.

Berkshire. By IAN YARROW. 8½×5½. Pp. 362. 49 illustrations. Map. [The County Books.] London : Robert Hale Ltd, 1952. 18s.

Surrey. By J. CHARLES FOX. Revised by E. F. Peeler. 6½×3½. Pp. xii+160. 60 illustrations. Map. [The Little Guides.] London : Methuen and Co. Ltd. Seventh edition, 1952. 9s 6d.

Le Peuplement des grandes Agglomérations urbaines Londres et Paris aux XIXe et XXe Siècles. By STANISLAS KORZYBSKI. Reprint : Population, 1952, 7 (3) : 485-520. 16 figs.

Steinernes Wunderland : Die Formenwelt der Alpen. By FRITZ AURADA. 7½×5. Pp. 150. 45 figs. 21 illustrations. [Kleine Länderkunden.] Stuttgart : Franckh-sche Verlagshandlung, 1951. DM 8.80.

ASIA

Der Erdteil Asien. By ARVED SCHULTZ. 7½×5. Pp. 231. 32 illustrations. 8 maps. [Kleine Länderkunden.] Stuttgart : Franckh-sche Verlagshandlung, 1950. DM 9.80.

The Fire Ox and Other Years. By SUYDAM CUTTING, HON. C.B.E., F.R.G.S. 9½×7. Pp. xviii+393. 128 plates+3 in colour. 3 maps. London : William Collins, Sons and Co. Ltd, 1947. 30s.

The Development of Upland Areas in the Far East. Vol. I. Part I. *China.* By PIERRE GOUROU. Part II. *The Philippines.* By JOSEPH E. SPENCER. Part III. *Japan.* By GLENN T. TREWARtha. 11×8½. Pp. 82 (mimeographed). New York : International Secretariat, Institute of Pacific Relations, 1949. \$1.00.

AFRICA

Land Use and Soil Conservation in Parts of Onitsha and Owerri Provinces. By A. T. GROVE, M.A., F.R.G.S. Preface by R. R. E. Jacobson. 10×8. Pp. viii+79. 12 figs. 8 photographs. Map. [Geological Survey of Nigeria, Bulletin No. 21.] Zaria : Gaskiya Corporation, 1951. 10s 6d.

Land Use and Soil Conservation on the Jos Plateau. By A. T. GROVE, M.A., F.R.G.S. Preface by R. R. E. Jacobson. 10×8. Pp. iv+63. 10 figs. 9 photographs. Map. [Geological Survey of Nigeria, Bulletin No. 22.] Zaria : Gaskiya Corporation, 1952. 10s 6d.

The Year Book and Guide to East Africa. Edited by A. GORDON-BROWN, F.R.G.S., for the Union-Castle Mail Steamship Co. Ltd. 7½×4½. Pp. xxxii+439+16 (atlas) +99 (advertisements). Folding map. London : Robert Hale Ltd, 1953 edition. 7s 6d.

The Year Book and Guide to Southern Africa. Edited by A. GORDON-BROWN, F.R.G.S., for the Union-Castle Mail Steamship Co. Ltd. 7½×4½. Pp. lvi+858+48 (atlas) +155 (advertisements). London : Robert Hale Ltd, 1953 edition. 9s 6d.

The Golden Land : A Background to South Africa. By JULIAN MOCKFORD. 8½×5½. Pp. viii+270. 35 illustrations. London : Adam and Charles Black Ltd, 1949. 12s 6d.

The Sun-Drenched Veldt. By KATHARINE L. SIMMS. 8½×5½. Pp. 144. 17 illustrations. End-paper sketch map. [Windows on the World.] London : Evans Brothers Ltd, 1949. 9s 6d.

AUSTRALASIA

Australien. By K. H. PFEFFER. 7½×5. Pp. 160. 18 figs. 24 illustrations. Map. [Kleine Länderkunden.] Stuttgart : Franckh'sche Verlagsbuchhandlung, 1950. DM 9.80.

Statistical Register of Western Australia for 1948-1949. Compiled by R. J. LITTLE. 9½×6. Sections paged separately. Perth, W. A. : William H. Wyatt, Government Printer, 1952.

The New Zealand Official Year-Book, 1951-52. Fifty-seventh issue. Compiled in the CENSUS AND STATISTICS DEPARTMENT, NEW ZEALAND. Foreword by G. E. Wood, Government Statistician. 9½×6. Pp. xi+1120. Map. Wellington, N.Z. : R. E. Owen, Government Printer, 1952. 15s.

CARTOGRAPHY

World Cartography. Vol. I. 11×8½. Pp. v+107. 24 figs. [UN Publications Sales No. 1951, I. 9.] New York : Department of Social Affairs, United Nations, 1951. \$1.25. London : H.M. Stationery Office. 9s.

OCEANOGRAPHY

Ur- und Neuzeane. By HANS STILLE. 11½×8½. Pp. 68. 4 figs. Map. [Abhandlungen der Deutschen Akademie der Wissenschaften zu Berlin, 1945-46, No. 6.] Berlin : Akademie-Verlag, 1948. DM 7.00.

EDUCATIONAL

Selected Exercises upon Geological Maps. By JOHN I. PLATT, M.Sc., F.G.S. 8½×11. Pp. 32. London : Thomas Murby and Co., 1951. 6s.

Nature at Work. Secondary Series. By E. M. STEPHENSON. 7½×5½. Book I. Pp. viii+1-88. Figs. 1-58. Book II. Pp. viii+89-190. Figs. 59-118. London : A. and C. Black Ltd, 1951. Book I, 4s 3d. Book II, 4s 9d.

The Story of Ships. By S. E. ELLACOTT. 8½×6½. Pp. 76. Illustrated by the author. [Methuen's Outlines.] London : Methuen and Co. Ltd, 1952. 8s 6d.

The Story of Aircraft. By S. E. ELLACOTT. 8½×6½. Pp. 75. Illustrated by the author. [Methuen's Outlines.] London : Methuen and Co. Ltd, 1952. 8s 6d.

Bridges. By LEONORA FRY. 8½×5½. Pp. 48. Illustrated by R. Barnard Way. [The 'Get to Know' Series.] London : Methuen and Co. Ltd, 1951. 2s.

Houses and Flats. By PATRICK THORNHILL. 8½×5½. Pp. 48. Drawings. [The 'Get to Know' Series.] London : Methuen and Co. Ltd, 1953. 2s.

GENERAL

Modern Geographers: An Outline of Progress in Geography since 1800 A.D. By G. R. CRONE. $8\frac{1}{2} \times 5\frac{1}{2}$. Pp. 56. 1 fig. 7 portraits. London : The Royal Geographical Society ; John Murray, 1951. 3s 6d.

A German and English Glossary of Geographical Terms. By ERIC FISCHER and FRANCIS E. ELLIOTT. $8\frac{1}{2} \times 5\frac{1}{2}$. Pp. vii + 111. [American Geographical Society Library Series No. 5.] New York : The American Geographical Society of New York, 1950.

Cities in Evolution. By PATRICK GEDDES. $8\frac{1}{2} \times 5\frac{1}{2}$. Pp. xxxi + 241. Illustrated. London : Williams and Norgate Ltd. New and revised edition, 1949. 18s.

Theses in the Social Sciences: An International Analytical Catalogue of Unpublished Doctorate Theses, 1940-1950. $9\frac{1}{2} \times 6\frac{1}{2}$. Pp. 236. Paris : Unesco, 1952. London : H.M. Stationery Office. 7s 6d.

Ship Recognition : Merchant Ships. By LAURENCE DUNN. $5 \times 7\frac{1}{2}$. Pp. 128. 72 figs. 165 photographs. Southampton : Robert Ross and Co. Ltd. London : George G. Harrap and Co. Ltd, n.d. [1952]. 12s 6d.

MAPS

The Services and Collections of the Map Division. The Library of Congress. By WALTER W. RISTOW. $10\frac{1}{2} \times 7$. Pp. 22. 17 plates. Washington, D.C. : Superintendent of Documents, U.S. Government Printing Office, 1951. \$0.40.

Ancient Britain : A Map of the Major Visible Antiquities of Great Britain older than A.D. 1066. Scale : 1 : 625,000. North Sheet. South Sheet. Foreword, Introduction, and Combined Index. $8\frac{1}{2} \times 5\frac{1}{2}$. Pp. 36. Chessington : Director General of the Ordnance Survey, 1951. 6s 9d per sheet.

ROYAL SCOTTISH GEOGRAPHICAL SOCIETY

PROCEEDINGS

MEETINGS OF COUNCIL were held on the 20th January and 10th March 1953.

OBITUARY

It is with regret that the Society records the death of JOHN McFARLANE, M.A., F.R.S.G.S., late Chairman of the Aberdeen Centre of the Society, and of J. HAMILTON BIRRELL, M.A., PH.D., Member of Council, 1933-1938.

MEDAL AWARD

The Mungo Park Medal was awarded to Count EIGIL KNUTH for "outstanding exploration in Greenland, 1932-1952."

LECTURE SESSION, 1952-1953

Owing to the continued illness of HENRY WOOD, M.A., PH.D., F.R.S.E., the paper on "The Herring Industry," postponed from December 4th, 1952 [Vol. 68, No. 2, page 95], was given by Mr R. H. JOHNSTON, of the Scottish Home Department, on 26th February 1953.

A SPECIAL LECTURE on "The Swiss Everest Expedition" (Spring 1952) was given by ANDRÉ ROCH in the Usher Hall, Edinburgh, on 26th January 1953.

NEWBIGIN PRIZE : 1953 AWARD

A Bronze Medal and Money Prize will be awarded for the best Essay, suitable for publication in *The Scottish Geographical Magazine* and not exceeding 7000 words in length, on any subject relating to the geography of Scotland.

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